# CROP EXPERIMENTS,

# BOMBAY PRESIDENCY,

# 1891-92.

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No. 3785 of 1892.

From

E. L. CAPPEL, Esquire, I.C.S.,

Director, Land Records and Agriculture;

To

T. D. MACKENZIE, Esquire, I.C.S.,

Chief Secretary to Government,

Revenue Department, Bombay.

*Poona, 31st December 1892.*

Sir,

I have the honour to submit, through the Commissioners of Divisions, the Analysis of the Crop Experiments conducted during the year 1891-92.

2. In all, 83 experiments were made during the year against 78 conducted last year:—

| Division. | 1890-91. | 1891 92. | | | Increase (+) or Decrease (—). |
|---|---|---|---|---|---|
| | | Reported. | Rejected. | Total. | |
| Northern Division ... ... | 32 | 27 | 3 | 30 | —2 |
| Central Division ... ... | 24 | 24 | 5 | 29 | +5 |
| Southern Division ... ... | 22 | 21 | 3 | 24 | +2 |
| Total ... | 78 | 72 | 11 | 83 | +5 |

The total number of experiments, though larger than that in any of the previous five years, is still below the required standard, particularly in the Central and Southern Divisions. This was mainly due, in the year under report, to the exceptionally unfavourable season in the South Deccan and Karnátak. Here experimenters, where their time was not fully taken up by the threatening scarcity, had some difficulty in finding crops suitable for test. In Ahmadnagar, where the failure of crops was not very pronounced, the crops selected produced in only one instance an outturn exceeding half average.

3. The number rejected is large, but it is satisfactory to note that standing orders on the subject are generally better understood and more closely adhered to than heretofore. Only one officer, Mr. Vádekar (Ahmadnagar), has attempted a special test.

4. A few attempts have been made to estimate cost of cultivation, but the results are mostly so meagrely reported that only two are noted in the analysis. It has on previous occasions been brought to the notice of experimenters that, unless they find leisure to deal fully with the question, details of cost of cultivation in ordinary experiments are not useful. Full details of the cost of cultivation are, of course, essential in special experiments.

5. The programme, which was on the same general lines as that of the previous year, was not fully adhered to. This was due in part, as stated above, to seasonal causes. The marginal table shows the number of experiments carried out on the various staples in each division. Rice tests are the most numerous and give important results. Rice experiments in Belgaum show considerable differences of outturn as compared with the formulæ, and further trials are required to place results beyond doubt. Next in importance come the oilseeds with 18 tests. The Ahmadnagar experiments were all on mixed crops, *kardai* being the subordinate crop in each case. An extraordinary outturn of wheat reported from Akola seems to need verification by further test. The experiments on hill grains, *nágli* and *harik*, go to supplement the useful information recorded in last year's report. The sugarcane experiments in Poona are interesting as showing the high cultivation carried on at great centres.

| Crop. | Northern Division. | Central Division. | Southern Division. | Total. |
|---|---|---|---|---|
| Rice ... ... ... | 12 | ... | 8 | 20 |
| Oilseeds ... .. ... | 3 | 15 | ... | 18 |
| Wheat ... ... ... | 3 | 3 | 3 | 9 |
| Mixed crops ... ... | ... | 6 | 1 | 7 |
| Nágli or bávto ... ... | 2 | ... | 5 | 7 |
| Sugarcane ... ... ... | ... | 3 | 2 | 5 |
| Pulses ... ... ... | 4 | ... | 1 | 5 |
| Harik or Kodra ... ... | 2 | ... | 2 | 4 |
| Cotton ... ... ... | 2 | ... | ... | 2 |
| Navani or rála ... ... | ... | ... | 2 | 2 |
| Maize and juvár, 1 each ... | 2 | ... | ... | 2 |
| Patato and coriander, 1 each ... | ... | 2 | ... | 2 |
| Total ... | 30 | 29 | 24 | 83 |

6. There are several instances this year, as last, in which the anna estimates are apparently wide of the mark, and the attention of experimenters should be directed to this point, which is of special importance as a check on the *formulæ* which have been shown to require thorough revision. Special reference was made to this matter in paragraph 4 of Mr. Ozanne's letter forwarding the Crop Experiment Report for 1885-86.

7. Under Government Resolution No. 8139, dated 13th October 1892, crop experiments are henceforward to be carried out on an extended scale to meet the requirements of the new quinquennial outturn returns. Each Assistant and Deputy Collector will make 3 (instead of 2) *ordinary* experiments or in lieu thereof one *special* experiment. Superintendents of Farms and Divisional Inspectors are to conduct experiments under the same ruling. The programme for the current season has been arranged in consultation with Collectors, attention for the present being now, for the special purpose noted, directed mainly to the staple crops of each district.

8. I have pleasure in bringing to notice the names of the undermentioned officers who have forwarded good and careful reports :—

Northern Division... ... ... Messrs. Batchelor, Phirozsháh and Baig.

Central Division ... ... ... Messrs. Vádekar, Morison, Mollison, and Fawcett.

Southern Division ... ... Messrs. DuBoulay, Orr and Ajgáonkar.

Mr. Cooke, Collector of Kaira, made eight valuable and well reported experiments in lieu of his Assistants who were unavoidably prevented from experimenting.

9. The reports have been carefully scrutinized by Mr. Mollison, whose criticism has been of great value to me in their review.

I have the honour to be,
Sir,
Your most obedient servant,
E. L. CAPPEL,
Director, Land Records and Agriculture,
Bombay.

# ANALYSIS OF CROP EXPERIMENTS.

## NORTHERN DIVISION.

### Ahmadabad.

Six experiments have been reported from this district:—

| | | | |
|---|---|---|---|
| Mr. G. S. Curtis | ... | ... | ... 1 on wheat. |
| Mr. J. K. N. Kábráji... | | ... | .. 1 „ cotton. |
| Mr. B. E. Modi | ... | ... | ... 4 „ rice. |

Mr. Curtis failed to make rice experiments as arranged, owing to the interference of other duties. Mr. Kábráji proceeded on leave before he could complete his test on cotton.

*Mr. G. S. Curtis, Assistant Collector.*

Submits one test on irrigated soft-red wheat. The report is meagre, giving little beyond the tabulated figures. The field selected grows two crops every year, and, inclusive of water-rate, is assessed at Rs. 5-12-2 per acre. The crop is described as short in straw and ear and is estimated at 11 annas. But the outturn (2,051 lbs. grain) indicates that it was a bumper crop. The straw and chaff were not weighed. The gross acre value comes to Rs. 76-4-0. After the rain crop (*juvár*) was harvested, 20 loads cowdung were applied per acre. The season was very dry, but this would have little effect upon an irrigated crop. It was probably advantageous in a district so subject to rust as the Ahmadabad Collectorate. The seed was broadcasted in November and the crop was ripe in March. The seed-rate is high, 164 lbs. per acre, but an irrigated crop takes more seed than a dry crop.

*Mr. J. K. N. Kábráji, Assistant Collector.*

Commenced a test on cotton (*vágadia*) but took leave before finishing it. The experimenter was present at the first picking. The second was left to the Mámlatdár. This variety is gathered in the pod; the crop yielded 182 lbs. per acre of lint and seed and 75 lbs. of shells, &c. This would represent about 60 lbs. of clean cotton per acre, a very poor return from good soil in a favourable season. I doubt whether the figures are trustworthy, and no details of cultivation are given. The crop was picked so late as the 6th and 31st March, without any explanation of this circumstance. Under the circumstances I am compelled to exclude this experiment as untrustworthy.

*Mr. Bamanji Edalji Modi, District Deputy Collector.*

Sends four carefully conducted tests, all on rice. Of these, two (Nos. 4 and 5) are on land recently reclaimed from waste under command of an adjacent tank. The soil of these fields is a stiff loam (*besar*), and, inclusive of water-rate the numbers are assessed at Rs. 5-4-6 and Rs. 5-13-10 per acre. *Kamod*, a fine variety of rice requiring plenty of water, was grown on one field (No. 4), and, owing to scant rainfall in the latter part of the season, gave a rather poor yield (951 lbs. grain per acre). The monsoon rain was late and rice seedlings were, not transplanted until the end of September. 40 lbs. of seed gave seedlings sufficient for 2 acres. *Sutarsál* rice on the second field (No. 5), grown under precisely similar conditions, gave an outturn of 1,561 lbs. grain per acre. Compared with *kamod* rice, this variety requires less water and is worth 4 to 8 annas less per 40 lbs. Each field was fairly manured and the cultivation is described as good.

Two other tests (Nos. 2 and 3) of *sutarsál* rice were made by this experimenter. One on light soil (*gorádu*), the other on *besar* land. Each crop was grown from seedlings transplanted late in the season. Late rains held off, and both fields were irrigated, the light land four times, the heavier soil three. These fields grow rice every year. The *besar* land carries occasionally a second crop (barley). Neither field was manured this year. An outturn of 1,526 lbs. per

acre from the *besar* and 1,042 lbs. per acre from the light land are estimated as 15 and 14-anna crops. The incidence of assessment on the latter field is rather high, 21·42 per cent. The anna estimates may be fair for an unfavourable season such as this, but would not apply to an average one.

## Kaira.

The eight experiments received from this district were all conducted by the Collector. Neither Mr. Lawrence, the Assistant, nor Mr. Motilál, the District Deputy Collector, experimented. The Collector writes: "I am quite satisfied that it was impossible both for my Assistant and Deputy to conduct any crop experiments this year, the former owing to his having to attend the usual examination and inexperience, and the latter owing to his having to try some very heavy border affray cases which tied his camp down to one place and to his annual examination of the *Jamábandi* returns."

*Mr. H. R. Cooke, Collector.*

Sends in all eight tests. The four rice experiments were taken on crops selected with the object of gaining special information. Mr. Cooke fully describes the object of each test. The two *bárto* and two *kodra* tests were undertaken, because the Deputy Collector was unable to experiment and the crops tested were admittedly in three instances under the average of similar crops in the same localities. The Collector explains that these crops (*bávto* and *kodra*) varied considerably within a limited radius owing to heavy local showers in June and July. For the rice experiments the Collector endeavoured to select crops :—

(*a*) to represent a full average in an ordinary year,

(*b*) to represent 8-anna or half crops.

The full average crops were of *jini* and *kamod* rice, both good and representative plots. The field under *jini* (No. 11) was irrigated twice from the Khári river and once from a well, and inclusive of water-rate, is assessed at Rs. 10-5-0 per acre. That under *kamod* (No. 13) is assessed, inclusive of water-rate, at Rs. 8-12-10 per acre, and was irrigated three times from the Khári river and from a tank. The first field has *besar kiári* soil and was manured with fifteen cart-loads ordinary manure. The second field is *besar* and to this only 5½ loads per acre were applied. The first field carries occasionally a second crop (barley or wheat). The second field carries a second crop of wheat every year. The *jini* rice had a seed-rate of 18 lbs. per acre, sown in July, seedlings being transplanted in September. The crop was harvested on the 22nd of November and produced 2,774 lbs. of grain per acre, giving with the straw a gross value of Rs. 83-10-7. The *kamod* with a seed-rate of 14 lbs. per acre, sown in July and seedlings transplanted in August, gave an outturn of 2,694 lbs. of grain. The crop was harvested on the 24th of November. The gross value per acre of this crop was Rs. 94-9-8, *kamod* being a fine variety commanding a high price. The outturn figures have been corrected in my office. The weighments were made at the time of harvest and tests of samples preserved showed that dryage amounted to 10 to 12 per cent. The experimenter explains that it is impossible to ascertain the proportional area of seed-bed to area of transplantation, the seed-beds being formed near the villages at a distance from the fields and their boundaries being afterwards irrecoverable.

A crop of *jini* rice (No. 10) estimated at 8 annas, irrigated three times, was raised from seedlings transplanted in August in *besar kiári* land. The field is assessed, inclusive of water-rate, at Rs. 8-3-9 per acre. The outturn was 1,427 lbs. of grain per acre. *Sutarsál* rice (No. 12) estimated at 7 annas, and grown on land assessed at Rs. 6-3-2, gave 1,562 lbs. grain per acre. In this case the seed-rate appears to be under-estimated at 8¼th lbs. per acre.

The Collector has devoted so much painstaking labour to all his experiments that I regret my inability to accept his *bávto* and *kodra* tests (Nos. 6—9) except under caution. They are, however, recorded for what they are worth. The grain was weighed before it was dry. Samples retained were kept in corked bottles, so that they failed to show a normal decrease by dryage. The Collector says that the cultivator keeps his grain as secure from dryage as possible, but

ordinary exposure must take place. *Kodra* and *bávto*, the Collector remarks, are rarely grown alone. The subordinate mixture was literally a sprinkling a plant here and there of túr, jowár, math, mug and cotton. The subordinate mixtures are, however, often more pronounced than this in the Kaira district. *Kodra* is recognized as an exhaustive crop in Gujarát and is rarely taken on the same land in consecutive years, unless there is a considerable admixture of *túr*, usually drilled in separate rows, this deep-rooted pulse, which takes 8 or more months to mature, having a well defined fertilizing influence on the soil.

## Panch Mahals.

Mr. E. Maconochie was unable to carry out the programme owing to the exigencies of his tour. The Collector accepts his explanation as satisfactory. Three experiments in all are reported, one by Mr. Maconochie on rice, and two on maize and gram by Mr. Pránlál Harkisandás, District Deputy Collector

*Mr. E. Maconochie, Assistant Collector.*

Furnishes only one test (No. 14) on *vánkla* rice, an inferior variety. The crop was grown on *kiári* land assessed at Re. 0-14-6 per acre. The rainfall came late and ended early and was not supplemented by irrigation. The seed 20½ lbs. per acre was broadcasted, presumably in July, although no date is given. Seedlings failed and the field was re-sown at a similar rate. The field was fairly manured but carelessly cultivated. The soil, mixed black, carries rice every year. The outturn estimated at 8 annas amounts to 810 lbs. grain (against 640 of the formulæ) and 700 lbs. of straw per acre. The straw was short and grain did not fill well. This may be attributed to a short rainfall coupled with neglect of weeding. The percentage incidence of assessment on outturn is low.

*Mr. Pránlál Harkisandás, District Deputy Collector.*

This officer's double test (Nos. 15 and 16) taken on rain and rabi crops grown on the same field, goes to show what the burden of assessment is on land carrying two crops in one year. The second crop occupied precisely the same area as the first. The report is very meagre. The field was light brown *gorádu* soil, assessed at Re. 1-14-0 per acre. The kharif crop was maize, drilled on the 29th June and ripe on the 15th October. The field was unmanured, and with a favourable season the cultivator may well be satisfied with an outturn of 1,436 lbs. grain and 1,332 lbs. of fodder per acre, the gross value of which comes to Rs. 32-10-0. The experimenter estimates this as a 12-anna crop, but it would denote 18 annas according to the formulæ. The general average of the táluka, however, was 12 annas.

Red gram with a subordinate mixture of barley and rape was drilled on the 7th November and harvested on the 8th March, when apparently all the crops were ripe. The seed-rate was 64 lbs. gram, 19½ lbs. barley and 1 lb. 11 tolas rape per acre. The experimenter's figures indicate that there were three rows of gram alternating with one mixed row of barley and rape; but this is not quite clear. The crop was unmanured. The experimenter states that the moisture in the soil was insufficient for the mixed crop, leading to a poor outturn. I doubt whether this remark is accurate. Gram can do with a minimum quantity of moisture, and barley and rape without sufficient moisture would have matured or withered in less than four months, the period which elapsed between sowing and harvest. Considering that the land was unmanured the outturn of grain, 443 lbs. gram, 111 lbs. barley and 11 lbs. of oilseed, was favourable. Taking the value of rain and rabi crops together, the percentage incidence of assessment works out 4·04 and this would have been lowered if the field had had liberal management.

## Broach.

According to the programme the Collector requested each of his Assistants to conduct a special test in addition to the ordinary tests, if possible. This Mr. Batchelor and Mr. Phirozsháh Pestanji both failed to carry out owing to difficulties which apparently might have been overcome; but each officer forwards three ordinary experiments.

*Mr. S. L. Batchelor, Assistant Collector.*

Three ordinary tests carefully conducted and well reported. The first experiment (No. 17) is on wheat grown on black cotton soil assessed at Rs. 3-12-7 per acre, carrying cotton and wheat in alternate years. The crop was selected as representative of similar crops in the Broach, A'mod and Jambusar tálukas, where this year wheat and *láng* approached the bumper standard of outturn. The wheat is described as "Potya", but the sample received shows it to be a hard yellow variety. No manure was applied. The cultivation is described as good, the field being carefully ploughed, free from weeds and giving evidence of careful husbandry. The seed, 40 lbs. per acre, was drilled with a two-coulter drill in November and produced a crop, ripe in February, which yielded 492 lbs. grain and 810 lbs. straw. This is probably over-estimated at 18 annas. Good deep black soil under favourable conditions should give a much better outturn.

*Láng* (No. 18) in higher assessed black soil yielded excellently, and if, as the experimenter thinks, the crop represented the general outturn of three important tálukas, then the harvest throughout was unusually good. This particular field lies low and usually remains moist during the year. Sometimes with a heavy rainfall it gets too wet and on this account the cultivator is prevented from taking cotton every year. The general luxuriance of the *láng* crop is attributed to plentiful rains coupled with absence of cloudy weather in the latter part of the season. The field was ploughed six times during breaks in the monsoon and the seed 40 lbs. per acre was drilled in October. No manure was applied. The crop was ripe in February and yielded per acre 925 lbs. pulse and 1,323 lbs. fodder, and is estimated at 19 annas.

*Juvár* (No. 19) on deep black soil, unmanured but ploughed four times, did not give the outturn which the bumper estimate should imply; 792 lbs. grain per acre cannot class a *juvár* crop on such land above 12 annas or thereabouts. The experimenter has apparently undervalued the 364 bundles of *kadbi* per acre, which probably weighed more than 2 lbs. each as estimated.

The incidence of assessment in each of Mr. Batchelor's tests is high and the explanation may be found in the fact that the crops experimented upon are distinctly subsidiary to cotton, the rent-paying crop of Broach and Surat.

*Mr. Phirozsháh Pestanji, District Deputy Collector.*

A new experimenter; submits three ordinary tests on (1) láng, (2) wheat and (3) cotton. The reports are carefully drawn up and give full information on all points of interest.

This officer's *láng* test (No. 20) may be contrasted with Mr. Batchelor's (No 18). The crop was grown on good black soil assessed at Rs. 4-13-4 per acre. The seed-rate was 41 lbs. per acre. Seed was drilled in October and crop was ripe third week in February. The outturn, 1,055 lbs. pulse and 1,520 lbs. fodder per acre, is considerably under-estimated at 12 annas. Cotton rotates with *láng* or wheat in this field and, under ordinary circumstances, would have been the crop this year, but a heavy rainfall of 60 inches (average 25) swamped the cotton seedlings and *láng* was taken as a rabi crop. Doubtless the heavy rainfall favoured the *láng* which delights in a deep damp soil; but in one part of the field it appears to have been too much even for this crop. The part of the field under *láng* is cultivated by the registered occupant. The rest was this year cropped by a tenant who pays Rs. 12 per acre which proves that in this case the assessment is light.

For rabi crops the season was most favourable. With a seed-rate of 61½ lbs. per acre drilled in October the wheat crop (No. 21) was ripe at the end of February and produced 849 lbs. of grain and 1,130 lbs. of straw per acre. This yield is also estimated at 12 annas, probably an under-estimate. The tenant by whom this wheat crop was grown manures his land every third year, though the occupant uses no manure. This is of course attributable to the Rs. 12 rent paid, which compels high farming.

This officer's third test (No. 22) on cotton is open to question, as he himself supervised two pickings but left the third to táluka officers. The experimenter states that he closely examined the crop when the second picking was completed and saw then very few immature bolls, and on this account deducts

17 lbs. from the recorded weight of the third picking or 87 lbs. seed cotton per acre. I should say that the crop was over-ripe when the first picking was undertaken; 338 lbs. per acre is abnormally high for one picking. Only a week elapsed between the first and second pickings. The third was made on April 8th, three weeks after the second. Altogether the produce, estimated at 14 annas, comes to 502 lbs. per acre of lint and seed, worth Rs. 29-1-1. The land is moderately good black and is assessed at Rs. 2-9-5 per acre. The heavy rainfall destroyed the first sowing, but seed was again sown in August and the season afterwards was very favourable. The seed-rate is stated at 7½ lbs. The seed was drilled with a two-coultered drill through the seed bowl and seed tubes, a practice unknown except in Broach.

## Surat.

The programme has not been carried out in this district, only three tests in castor having been forwarded. Messrs. Weir and Syad Nuruddin Khán conducted no experiments, the reason being unexplained. Mr. Dárásha carried out only 1 test, being detained at head-quarters by heavy criminal work.

*Mr. Anna Gopál Kotvál, District Deputy Collector.*

This officer's two castor-oil tests would have been of more value if full and accurate details had been given. The report is sketchy and the figures of the first test are apparently inaccurate. Each crop was a second crop after rice.

The first test (No. 23) was taken on black soil assessed at Rs. 7-12-8 per acre. The field was liberally manured for rice. The castor-seed 45 lbs. per acre (a high seed-rate) produced a crop estimated at 12 annas, ripe early in March. This produced 155 lbs. purified oil and 303 lbs. *khol* or oil-cake per acre. The ratio between the two products is questionable, as a larger proportion of oil should have been obtained. The waste is not recorded, and the weight of oilseed per acre had to be called for by a special reference. The results as finally ascertained are noted below. The *khol* used as manure is said to have been worth 85 lbs. per rupee at date of experiment, an unusual and suspiciously high rate.

The second test (No. 24) is probably more trustworthy. The crop was sown about the same time and in the same manner but with a lower seed-rate, 33 lbs. per acre. The soil, also black, is assessed at Rs. 3-4-4 per acre. This field also was liberally manured for rice. The produce from this crop, treated in precisely the same way, gave 201 lbs. purified oil and 287 lbs. *khol* per acre. This result gives almost identically the same ratio of oil to oil-cake as that recorded in experiment No. 23 of last year, and that test shows a waste of 6·7 per cent. in manufacture.

The results per acre may be put with advantage in the form adopted last year :—

| Experiment. | Weight of seed. | Weight of oil. | Weight of *khol*. | Value of oil. | Value of *khol*. | Total Value. | Assessment. | Percentage incidence. |
|---|---|---|---|---|---|---|---|---|
| | Lbs. t. | Lbs. t. | Lbs. t. | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. | |
| 1st test ... ... | 458 18 | 155 14 | 303 4 | 21 7 10 | 3 9 6 | 25 1 4 | 7 12 8 | 31·01 |
| 2nd do. ... ... | 488 23 | 201 23 | 286 38 | 27 14 2 | 3 6 2 | 31 4 4 | 3 4 4 | 10·44 |

Compared with the figures recorded last year the following points may be noticed. The percentage of oil to seed comes to 33·89 per cent. in the 1st and 41·16 in the 2nd test against 39·04 in that of last year. The ratio of oil to *khol* is 100 : 195·1 in the first; 100 : 142·3 in the second; and 100 : 138·7 in the last year's test. The percentage of seed to *khol* is 66·11 in 1st, 58·84 in the 2nd, and 54·16 in that of last year. No wastage is shown in this year's tests.

*Mr. Dárásha Dosábhái, District Deputy Collector.*

Tested castor (No. 25) grown on black land assessed at Re. 1-13-8 per acre. Drilled in October the crop was ripe in the end of February and produced 427 lbs. of seed estimated as a 10-anna yield. The assessment does not seem high, particularly as the field was unmanured, a rather unusual practice with this crop. The field appears to have been under this crop for three years past. With only one crop the percentage incidence of assessment on produce works out 9·41.

## Tha'na.

Messrs. Baig and Cursetji forward two tests each. Mr. Pratt was exempted by the Collector, having been entrusted with special duty in connection with the testing of the annual production of toddy trees.

*Mr. Mirza Abbás Ali Baig, Assistant Collector.*

Furnishes two tests, which are well and fully reported, and probably as valuable as any submitted this year. The first (No. 26) is on rice taken to show the value of good ráb in a year of deficient rainfall. The other (No. 27) is on *vál*, a second crop on the same field. The field selected has first class dark brown soil, assessed at Rs. 5-2-5 per acre, and carries rice followed by *vál* every year. This field, like many other bunded rice fields, is (excepting the seed-bed) unmanured. But the washings carried during the rains from higher levels doubtless add year by year to the depth as well as to the fertility of such land. The area of seed-bed was carefully measured and its proportion to area of transplantation ascertained; 44 lbs. of seed sown on 4 gunthas furnished seedlings sufficient for 29 gunthas. Subsequently the experimenter was able to ascertain the actual quantity of cowdung ordinarily used for ráb purposes. At the date of his second experiment Mr. Baig found the ráb material laid on the seed-bed preparatory to being burnt for the next rice crop. He found 192 lbs. dry cowdung per guntha and he estimates this as the average quantity used every year on this holding.

The seed was sown on the 27th June in the seed-bed and the crop was ripe early in November. The produce comes per acre to 988 lbs. of grain and about a ton of straw and chaff. The September-October rains practically failed, and the outturn of grain was seriously lessened.

The second crop was broadcasted at 43 lbs. per acre as soon as the rice stubble could be ploughed in. Requiring less moisture than rice the *vál* gave a fair outturn, 359 lbs. per acre.

The value of this experiment is enhanced by the attempt made to determine how far a cultivator can depend upon his own cattle for manure. A well-fed bullock was kept under supervision and was found to produce 20 lbs. of wet dung, equal to 5¼ lbs. dry matter in 24 hours. This is equivalent to 1,916 lbs. dry dung annually. Deducting half of this as produced during the day, and not available, and a sixth more used for fuel, there still remains 800 lbs. This would cover, at the rate used in the test, about 4 gunthas of seed-bed to produce seedlings sufficient for ¾ acre of transplantation; and a pair would supply a seed-bed of 1½ acres. The cultivator of the field experimented upon had 2 bullocks and a calf. The capacity of an under-fed bullock was also tested, and this animal was found to produce at the rate of 1,156 lbs. dry cowdung per year. An average cultivator of the district cultivates about 2½ acres of rice and generally owns a pair of bullocks, a milch cow and one or two young animals. Keeping in view the calculations noted, and making due allowance for wastage and for loss of manure while the animals are grazing or are at work, a cultivator should on these terms have sufficient for ráb purposes; and the experimenter remarks that in villages where tree loppings, brushwood and other forest produce are not procurable, he has seen cowdung saved with the utmost care in underground pits. The rayat generally, however, fails to appreciate the fact that the urine is, weight for weight, the more valuable part of the excreta for manurial purposes.

*Mr. J. M. Cursetji, District Deputy Collector.*

Submits two rice tests. The first crop was grown from transplanted seedlings, raised on a seed-bed rábed with cowdung, &c. The second crop was grown from sprouted seed, a risky plan, except with favourable early rain. This plan is known as the *ootta* system. The crops were grown on different portions of the same field, which is rented by a tenant, who pays the registered owner 34 maunds of rice for the right of occupancy over 4¼ acres. The experimenter has recorded the weight of the local ser of grain of each crop at more than double the weight found in my office, and the figures of seed-rates and acre yields are apparently equally untrustworthy. For this reason I am compelled to exclude these experiments which are otherwise carefully executed. Although useless for record they show that a crop raised from rábed seedlings has a decided advantage over crops raised from sprouted seed in a year when the rain is not seasonable.

# CENTRAL DIVISION.

## Kha'ndesh.

Only three officers forward experiments from this district:—

| | | |
|---|---|---|
| Mr. K. R. Bamanji | ... ... | 2 on linseed. |
| Mr. J. C. Gloster... | ... ... | 1 do. |
| Mr. Kázi Kamruddin. | ... ... | 2 sesamum. |
| | ... ... | 1 coriander. |

Mr. Shrinivás Báláji, who was asked to conduct tests in sesamum and linseed, states that the former crop was harvested before he could start on tour, and a test in linseed, which he took, was found to be defective for reasons not explained and was not reported. This explanation is regarded by the Collector as unsatisfactory. Mr. Gloster was to have conducted a second test in coriander, but his time was too fully taken up in the examination of the *Jamábandi* papers of the Bhusával táluka, where the revision survey had recently been introduced.

*Mr. K. R. Bamanji, Assistant Collector.*

Sends two linseed tests (Nos. 28 and 29). The yield in the first case is a bumper, and in the second a full average. The second field has rich black soil assessed at Rs. 2-2-6 per acre, which under ordinary conditions would have produced the best crop, but the lighter land of the first experiment produced 606 lbs. of seed per acre, the heavy land 384 lbs. Linseed is a delicate crop, peculiarly susceptible to injury from seasonal causes, and the experimenter is doubtless right in attributing the difference in yield to heavy late rain not well distributed, the effect of which the crop on the medium soil was best able to withstand. The returns from both fields would more than satisfy an average cultivator in this district. The yield usually varies from 250 to 400 lbs. The seed-rate, 17 lbs. on the light land, is nearly double the usual rate. The straw of linseed is of poor feeding value and the chaff also, unless it contains light seeds.

*Mr. J. C. Gloster, Assistant Collector.*

Furnishes a linseed test (No. 30) on land assessed at Re. 1-4-10. Cotton and jowári are the usual rotation, an occasional rabi crop being grown as is common throughout Khándesh. The rabi crop permits of the land being fallowed and more or less cleaned during the rains, if infested with the deep-rooted *kunda*. A late crop is taken and the land is then in better condition for cotton, the rent-paying crop, in the following year than if kharif crops were grown continuously. The soil of the field, reddish brown, has a marked slope and the experimenter says that it therefore lost the full benefit of the copious late rains. But more probably this was advantageous to the crop. 15 lbs. seed per acre drilled in November gave an outturn of 570 lbs. oilseed. This is much above the average at which the crop is estimated. The crop was ripe on the 11th February. The by-products, chaff and straw are valued at rather a high rate, Rs. 2-13-0 per acre.

*Mr. Kázi Kamruddin, District Deputy Collector.*

Furnishes three tests, two on sesamum and one on coriander. The latter is omitted because, though the crop is reported to have been grown unmixed, the sample of seed forwarded contained about ¼ by weight of mustard, the presence of which is not satisfactorily accounted for. Besides, the incidence of assessment in this test reaches 47·98 per cent., a rate which there is nothing to explain. A suspicion of inaccuracy attaches to the sesamum tests also, which compels me to exclude them. The test areas (25 gunthas and 1 acre respectively) were unduly large, and several inaccuracies in the tabulated figures were corrected in my office. Pound samples instead of measured sers were forwarded and standing orders have not been attended to. Contrasting the two tests we find 2 lbs. seed per acre drilled on poor land assessed at Re. 0-6-4 per acre, while 1 lb. per acre sufficed for better land assessed at Re. 1-4-0. The difference in the seed-rate

is accounted for by the difference in quality of the soil. In each field *til* is said to have followed cotton, but how land assessed at Re. 0-6-4 is capable of growing cotton is not understood. The yield from each field is said to be exactly the same—153 lbs. per acre. The oilseed from the best land is valued at 12½ lbs. per rupee, from the inferior soil at 16 lbs. per rupee. The outturn is too low in each case for a 12-anna estimate. The figures carry no conviction and I cannot accept the tests.

## Na'sik.

Six experiments have been received from this district. Mr. Deshmukh could not make a second test in linseed or niger, as both these crops were very poor.

*Mr. L. G. Deshmukh, Assistant Collector.*

Conducted a carefully reported test (No. 31) on *káthdli* sesamum. This black variety contains a greater percentage of oil than white *til* (Havri). The latter has, however, the higher market value and is largely used in the manufacture of sweetmeats. The seed-rate, 1⅝ lbs. per acre, is higher than the average rate of Khándesh. The seed being very small it is usually mixed with dry powdered cowdung and sand to secure even distribution. The crop tested was drilled in July and was ripe on the 21st October. The produce, 438 lbs. per acre, is estimated as an average crop. The land was unmanured. Cultivation and season were both good. The soil is black and the field is assessed at Re. 0-15-5 per acre. The stalks have little value except for fuel. The experimenter remarks upon the care that is exercised in handling the sheaves or bundles while drying, the seed capsules opening and the seed dropping out unless the sheaves are kept in an upright position. They are usually stooked on the threshing floor, and turned repeatedly to the sun so that they may dry as soon as possible. The seed is separated by inverting and shaking each bundle on to the threshing floor.

*Mr. H. W. Hayward, Assistant Collector.*

Three experiments are submitted by this officer. Two of them on *khurásni*, (Nos. 32 and 33) are interesting as showing the returns in a favourable year from poor stony *mál* land assessed at a low rate. The revision survey assessment is in each case 6 annas per acre. The fields were unmanured and are apparently incapable of producing crops every year. The land requires periodical fallows to produce during two or more years middling crops of *nágli* and *khurásni*, which are taken in rotation. In the first experiment it is doubtful whether the seed-rate, 3 lbs. per acre, is not too low. Broadcasted in July the crop was ripe in November, and gave 279 lbs. of oilseed and 880 lbs. by-product per acre; the latter though useful as fodder and for ráb is not valued.

With a higher seed-rate, 9 lbs. per acre, sown in the end of July, the second field gave much the same results, the gross value of outturn being in one case Rs. 10-5-0 per acre, in the other Rs. 9-11-0. The incidence of assessment is moderate. It must be remembered, however, that during fallows there is little return. The crops seem to be over-estimated at 16 annas.

Linseed (No. 34), tested by the same experimenter, grown on medium black soil assessed at Rs. 2-3-1, produced 251 lbs. seed per acre. The land was well cultivated, but the season was indifferent and the crop is over-estimated at 16 annas. The percentage incidence of assessment works out rather high. The seed was broadcasted; it is usually drilled.

*Mr. V. R. Patvardhan, Acting District Deputy Collector.*

Submits a *khurásni* test taken on poor *mál* land assessed in revision survey at Re. 0-4-4 per acre. *Rági* and *khurásni* are alternately taken, with an interval between crops of two years. The seed is, I think, under-estimated at 2 lbs. per acre. Sown broadcast in September the crop was ripe in December, and produced 58 lbs. of oilseed per acre. Want of rain affected the crop, which is estimated at 7 annas. It was irregular and in some parts of the field very poor. Tests should, if possible, be avoided on very irregular crops. This experimenter attempts to estimate the cost of cultivation, but without sufficient care or knowledge, and Mr. Patvardhan's estimates are totally inaccurate. I do not think the experiment worth inclusion.

*Mr. K. M. Thatte, District Deputy Collector.*

Mr. Thatte's safflower test is omitted. His report (with slight changes due to difference of crop) appears to be merely a close copy of his predecessor Mr. Patvardhan's.

## Ahmadnagar.

No experiments could be made in niger seed in Akola as proposed, little being sown this year and much of that little being destroyed by the heavy August rain. In other respects the programme was fairly followed, but the crops tested, with a single exception (wheat in Akola), were more or less poor owing to failure of late rains.

*Mr. Sorábji Padamji, Assistant Collector.*

Submits two experiments in the Kopargáon and Akola tálukas.

The first experiment (No. 35) was with gram, with subordinate rows of *jowári* and *kardai*. The two latter were sown mixed, one row of the mixture to five of gram. The crop, estimated at 4 annas, was practically a failure owing to deficient rainfall. The field has shallow *barad* soil, assessed at Re. 0-6-1. The *jowári* withered before it came into ear. The gram and *kardai* produced respectively 66½ lbs. and 30½ lbs. of pulse and oilseed per acre.

The returns from this experimenter's second test (No. 36) on good deep black soil, capable of holding moisture, are extremely good. The crop tested was wheat and *kardai*. The area under wheat was 6·5 times that under safflower, 30½ lbs. of wheat and 4½ lbs. safflower being sown mixed per acre. Drilled with the *moghad* (a three-coultered heavy drill) in October, the wheat was ripe in February, the safflower later. The outturn (under-estimated at 12 annas) comes to 1,956 lbs. wheat and 969 lbs. safflower per acre, the gross value being Rs. 108-6-5 per acre. The experimenter remarks that even with more favourable rain he doubts if the outturn could be much better, though more rain might have improved the quality of the wheat. The sample forwarded to my office had a bushel weight of 62½ lbs. This is by no means a bad weight for the *kátha* variety, although extra fine samples have been known to weigh up to 65 to 66 lbs. per bushel. I am somewhat suspicious of the accuracy of this test, because the season was adverse to the local rabi crops, the estimate being 6 annas only. Moreover, the outturn reported is more than seven times that of the formulæ for a 12-anna, and nearly 3¾ times that for a 20-anna or bumper crop. However, Mr. Padamji assures me that there has been no mistake and the results may be accepted with this caution.

*Mr. R. B. Stewart, Assistant Collector.*

Sends in two reports on mixed crops, the first being wheat with safflower, the second gram with safflower. The wheat (No. 37) yield is only 195 lbs. per acre, with oilseed 22 lbs. The 12-anna estimate of the wheat crop is too high, an error noted with this experimenter last year. Gram with safflower (No. 38) gave 475 lbs. of pulse and 7½ lbs. of oilseed. This was from a seed-rate of 52 lbs. of the former to 4 lbs. of the latter. The seed was drilled in each field in September, and the crops appear to have been ripe together on the 8th of February. This in the case of the gram and wheat is doubtful. A poor crop of wheat would certainly mature in less than six months.

*Mr. V. B. Vádekar, District Deputy Collector.*

Submits two special experiments on *jowári* and safflower mixed. Having taken only four gunthas for his test area the experimenter has not followed the rule which exacts a minimum area in special tests of five per cent. of the holding. The tests ought to have extended to at least half an acre in the first case and to one acre in the second. The experiments are otherwise carefully conducted. The first test deals with *barad* land with a slope which prevents the retention of rain water, so that ample and frequent showers are required to produce a good crop. The other field is flat black soil. Late rain was scanty and very unfavourable and reduced the yield in both to 11 annas. The somewhat low yield of grain in the first test is more than made up by the *kadbi*, which is double that of the

second test.

*First test.*—The crop tested (No. 39) covered the whole of the survey number (area 10 acres and 25 gunthas). The occupant, a *Marátha*, owns no other field, his income being supplemented by his emoluments as *pátil* of the village. He has a wife and five children to support, none of whom do any work. The field was cultivated partly by himself and partly by hired labour, which cost him Rs. 10-12-0. He owns four bullocks and borrowed six others without payment. The total yield of the holding came to—

| Crop. | Principal product. | By-products. |
|---|---|---|
| *Jowári* ... ... | 3,089½ lbs. | 3,294 bundles *kadbi*. |
| *Kardai* ... ... | 1,042 lbs. | 744 lbs. chaff. |

Deducting from this expenses in kind—

2,160 lbs. of *jowári* grain required as food for the family at 6 lbs. per day;
3,000 bundles of *kadbi*, cattle feed for five months at 20 bundles per day;
201 lbs. grain, 215 bundles *kadbi* and 49 lbs. chaff, being the contents of 215 bundles given to *balutedárs*;
42½ lbs. of *jowári* and 10½ lbs. of *kardai* seed sown.

There remained—

| | | | Rs. | a. | p. |
|---|---|---|---|---|---|
| *Jowári* | 686 lbs. | valued at ... ... | 20 | 10 | 4 |
| *Kardai* | 1,031½ lbs. | do. ... ... | 23 | 0 | 0 |
| *Kadbi* | 79 bundles | do. ... ... | 1 | 9 | 4 |
| Chaff | 695 lbs. | do. ... ... | 1 | 8 | 9 |
| | | Total ... | 46 | 12 | 5 |

Against this there were expenses in cash:—

| | Rs. | a. | p. |
|---|---|---|---|
| Hired labour ... ... ... ... | 10 | 12 | 0 |
| Oil-cake for four bullocks during working season ... | 15 | 0 | 0 |
| Local cess ... ... ... ... | 0 | 3 | 0 |
| Condiments at 10 annas per month ... ... | 7 | 8 | 0 |
| Oil at 12 annas per month... ... ... | 9 | 0 | 0 |
| Clothes ... ... ... ... | 8 | 8 | 0 |
| | 50 | 15 | 0 |

Thus there is a deficit of about Rs. 4-3-0, besides Rs. 3 to be paid as assessment. This he must defray from the emoluments (Rs. 132) which he receives as *pátil*. He has no debt to pay. It must be remembered that the season was a very unfavourable one.

*Second test.*—(No. 40). This holding (area 20 acres 14 gunthas) also belongs to a *Marátha*; *jowári* and *kardai* covered the whole area. No hired labour was employed, every operation being performed by the occupant himself and two female members of his family. He owns five bullocks and borrowed five others, the loan being repaid by assisting the owners in ploughing their fields. Besides the field tested the occupant has two other fields, which he lets, and for each of which he receives Rs. 10 clear of all charges. His total income may be put down thus:—

| Article. | Total yield. | Seed borrowed and repaid at 1½ times the original quantity. | Paid to village servants. | Home consumption (grain at 1½ lbs. per adult and *kadbi* at 5 bundles per bullock). | Net remainder. | Value of remainder. |
|---|---|---|---|---|---|---|
| | Lbs. | Lbs. | Lbs. | Lbs. | Lbs. | Rs. a. p. |
| Jowári ... ... | 8,453 | 122 | 791 | 2,700 | 4,840 | 145 10 4 |
| Kardai ... ... | 1,774 | 30½ | ... | ... | 1,743½ | 38 14 1 |
| Kadbi ... ... | *3,256 | ... | 305 | 2,951 | ... | ..... |
| Chaff... ... ... | 1,628 | ... | 152 | ... | 1,476 | 2 14 1 |
| | | | | | | 186 6 6 |

* Bundles.

Deduct expenses in cash :—

| | Rs. | a. | p. |
|---|---|---|---|
| *Kadbi* for cattle, the home produce having fallen short ... ... ... ... | 50 | 0 | 0 |
| Oil-cake during working season ... ... | 20 | 0 | 0 |
| Condiments at Re. 1¼ per mensem ... ... | 15 | 0 | 0 |
| Oil at Re. 1 per month ... ... ... | 12 | 0 | 0 |
| Local cess ... ... ... ... | 0 | 5 | 0 |
| Clothing for the family ... ... ... | 22 | 12 | 0 |
| Total ... | 120 | 1 | 0 |

Thus there is a balance of Rs. 66-5-6 from the holding, and after paying the assessment, Rs. 5, the occupant appears to have made in an unfavourable year a net profit of about Rs. 3 per acre. He has a debt of Rs. 75 to pay.

## Poona.

*Mr. C. P. B. Wiltshire, Assistant Collector.*

Sends three tests, two on dry-crop wheat and one on potatoes. The first wheat test (No. 41), taken on land assessed at Re. 1-5-2 and growing wheat every year, gives a disappointingly low outturn, only 188 lbs. grain and 292 lbs. straw and chaff per acre. From the second field (No. 42), bare-fallowed the year before and assessed at a slightly lower rate, the results are a little better. The anna estimate of each crop is much too high. The fields probably carried average crops for the season, but poor rabi crops were general. The samples forwarded to my office show bushel weights of 64 lbs. and 65 lbs. respectively, which are high considering the low yields, which were only threefold the seed sown in the first test and fourfold in the second. But the seed-rate reported is suspiciously high.

Mr. Wiltshire tested potatoes (No. 43) at Chakan. This crop was the second of two potato crops following each other in the same year, a practice that cannot be commended being most favourable to disease by exhausting the soil. Owing to deficient rainfall the water in the wells generally failed before the cold weather potato crop ripened, and although the disease was less injurious than in the previous year, possibly from this cause, the crops were generally poor. Mr. Wiltshire's test shows an outturn of little more than a ton per acre, about ⅕th of what a fair crop ought to be. The land was liberally manured and well cultivated. The percentage incidence of assessment is low, because prices of potatoes are now very high. The gross value of produce amounts to Rs. 84-12-3 per acre, not enough to pay expenses. The seed-rate is stated at 547 lbs. per acre. This is about 350 lbs. less than the weight usually planted.

*Mr. W. T. Morison, Assistant Collector.*

Reports two tests on groundnut and wheat. The groundnut (No. 44) was grown on the poor *mál* land, of which there are large tracts in the Indápur subdivision. The experiment shows the capabilities of such land when helped by irrigation. The irrigation would have been more beneficial if the field had been manured. It was intended to measure the actual quantity of water applied to the crop, but arrangements were not made in time for this test. The crop was watered eight times and gave 415 lbs. unshelled nuts per acre, a poor result compared with similar crops grown on richer soils. The seed-rate is much understated, at 14 lbs. per acre. The assessment for the whole field is annas 3 per acre; but the portion under groundnut is decidedly the most fertile part of it and is estimated by the experimenter to be worth at least 6 annas per acre.

Mr. Morison's second test (No. 45) was on *khapli* wheat grown as a second crop after maize, a well reported experiment. The crop was grown on red land assessed at Re. 1-0-10 per acre, apparently the ordinary dry-crop rate, although the field is classed as *bágáyat*. Mr. Morison explains that the character of the soil had less to do with the satisfactory yield than the careful tillage, ample manure, and regular watering, which it received. Drilled in September, the crop was ripe on the 21st February, being meanwhile watered 20 times. The bumper outturn of 1,971 lbs. grain and 1,930 lbs. straw was estimated at 16 annas and had a gross value of Rs. 85-0-10 per acre. The seed-rate was 109 lbs. per acre.

Mr. Morison remarks: "the field was rented by a *Máli* from the registered occupant who was to receive ⅓rd of the produce in consideration of paying the Government assessment only", and he concludes that the assessment is rather low, considering that the land is classed as garden land and is situated just outside the large market town of Indápur.

*Mr. J. Mollison, Superintendent of Farms.*

Conducted two very careful tests on sugarcane near Poona. His first test (No. 46) is on very heavily manured *murum* land cultivated by a tenant at a high rent which under standing orders should have been stated. Town sweepings worth Rs. 3,000 and castor cake valued at Rs. 600 were used for 23 *bighas*, (about 16 acres), the manure applied thus costing about Rs. 225 per acre. This figure, the experimenter thinks, may not be altogether true, but he notes that the character of the soil is being changed by the addition each year of large quantities of manure. Accurate information regarding the various tillage operations and their cost could not be ascertained. Harvesting and *gul*-making was done by contract, the usual rate being Rs. 16 per ten *pallas* or 2,400 lbs. of *gul* turned out. To each mill 11 men and 8 bullocks are attached. The fuel was supplied by the crushed cane and stripped leaves. The tops are used as feed for the work bullocks and are not valued, though the contractors manage to feed a good many more cattle with them than those worked. 690 lbs. of cane, passed through an ordinary 3-roller Poona mill, yielded 434 lbs. of juice, which filled the receiver in 62 minutes. Allowing for necessary stoppages, sufficient juice can be obtained in 2 hours and 25 minutes to charge an evaporating pan of the shallow pattern, 7 feet in diameter. Each charge weighs approximately 848 lbs. and this quantity took 2 hours 53 minutes for conversion into *gul*, which weighed 176 ¾ lbs.

The second test (No. 47) was made on an experimental plot on the Government farm at Kirkee. Details of every operation and its cost were recorded in the cultivation book kept on the farm. All work, of course, is done by hired labour. The net result per acre may be summarized as under:—

| | Rs. | a. | p. |
|---|---|---|---|
| 6,740 lbs. of *gul* sold at Rs. 14 per 246 lbs. ... ... | 383 | 9 | 2 |
| 2,843 lbs. of tops fed to farm bullocks (4) not used at the sugarcane mill ... ... ... ... | 5 | 0 | 0 |
| | 388 | 9 | 2 |
| Minus— | | | |
| Cultivation charges, manure, water-rate, assessment, &c. (for details *vide* Appendix) ... ... ... | 344 | 7 | 0 |
| Net profit per acre ... | 44 | 2 | 2 |

The following statement compares the results in the two tests per acre:—

| Details. | Experiment No. 1. | Experiment No. 2. |
|---|---|---|
| Number of canes cut ... ... ... ... | 30,160 | 29,830 |
| | Lbs. | Lbs. |
| Weight of canes with tops ... ... ... | 65,480 | 63,180 |
| Do. without tops ... ... ... | 56,840 | 54,650 |
| Weight of tops ... ... ... ... | 8,640 | 8,530 |
| Do. juice ... ... ... ... | 35,780 | 39,610 |
| Do. *gul* ... ... ... ... | 7,280 | 6,740 |
| Percentage of juice to cane topped ... ... ... | 62·9 | 72·5 |
| Do. of *gul* to do. ... ... ... | 12·8 | 12·3 |

The high percentage of juice to cane in the second test is probably accounted for in part by the fact that the canes in this case were repeatedly watered after being cut, as, if allowed to dry, the sap becomes too concentrated to be properly extracted by pressure.

Judging by the results of these tests and of that taken last year at Mundhva, Mr. Mollison is of opinion that the outturn cannot exceed a maximum of 12,500 lbs.

of *gul* per acre. He remarks that it would be difficult with the best possible cultivation to get that yield off a whole field of any extent. Sugarcane is a risky crop subject to many mishaps. It may be injured by rats, jackals, white ants, &c.; and the sugarcane-borer is each year becoming more destructive.

## Shola'pur.

None of the officers in this district reported experiments this year. Mr. Doderet's services were transferred early in February, and Mr. Brown was away with a Revenue Survey party.

Mr. Heblikar, District Deputy Collector, conducted a test in *jod* wheat, but before he could record the results, he discovered that the owner of the field had tampered with the produce, which rendered the test worthless. No other test could be undertaken owing to press of work in connection with the introduction of revision survey in Málsiras and with takávi advances. The season was also extremely adverse to experiment.

## Sa'ta'ra.

Four experiments, three in groundnuts and one in sugarcane, have been received from this district. Messrs. Pánse and Fawcett conducted only one test each, and Mr. Fry two. No explanation has been received of the omission to experiment by Mr. Scott, District Deputy Collector.

### *Mr. G. D. Pánse, Assistant Collector.*

Submits a groundnut test (No. 48) carefully conducted and fully reported. The field belongs to a money-lender, who has kept an exact account of the outlays connected with this crop.

*Cost of cultivation of ground-nut crop. Area 1 acre 3 gunthas.*

| Number. | Operation. Description. | Labour Per Day. Men. | Labour Per Day. Bullocks | Cost Per Day. Men. | Cost Per Day. Bullocks. | Total Labour. Men. | Total Labour. Bullocks. | Total Labour. Days. | Total Cost. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | A. p. | A. p. | | | | Rs. a. p. |
| I | Ploughing at end of April ... | 3 | 10 | 2 6 | 3 0 | 4½ | 15 | 1½ | 3 8 3 |
| II | Clod-crushing... ... ... | 1 | 4 | 2 6 | 3 0 | ½ | 2 | ½ | 0 7 3 |
| III | Manuring— | | | | | | | | |
| | (*a*) 10 cart-loads of manure at 8 annas per cart ... | ... | ... | ... | ... | ... | ... | ... | 5 0 0 |
| | (*b*) cartage to field ... | ... | ... | ... | ... | ... | ... | ... | 1 2 0 |
| | (*c*) spreading the same ... | 2 | ... | 2 6 | ... | 2 | ... | 1 | 0 5 0 |
| | (*d*) sheep-folding, 300 sheep for 3 days at Rs. 2-1-4 per day ... | ... | ... | ... | ... | ... | ... | ... | 6 4 0 |
| IV | Harrowing ... ... ... | 1 | 2 | 2 6 | 3 0 | ¼ | ½ | ¼ | 0 2 1½ |
| V | Sowing— | | | | | | | | |
| | (*a*) 40 sers of husked seed. | ... | ... | ... | ... | ... | ... | ... | 5 0 0 |
| | (*b*) sowing the same ... | 6 | 4 | 2 6 | 3 0 | 3 | 2 | ½ | 0 13 6 |
| VI | Hoeing... ... ... ... | 1 | 2 | 2 6 | 3 0 | 1 | 2 | 1 | 0 8 6 |
| VII | Watering— | | | | | | | | |
| | (*a*) 8 waterings of 1½ days each ... ... ... | 2 | 4 | 2 6 | 3 0 | 24 | 48 | 12 | 12 12 0 |
| | (*b*) proportionate cost of mot, rope, &c., and repairs ... ... | ... | ... | ... | ... | ... | ... | ... | 7 4 0 |
| VIII | Hand weeding (3 weedings)... | 8 | ... | 2 6 | ... | 24 | ... | 3 | 3 12 [illegible] |
| IX | Watching, no cost, being done by man at the mot ... ... | ... | ... | ... | ... | ... | ... | ... | ... |
| X | Harvesting— | | | | | | | | |
| | (*a*) Digging ... ... | 4 | 10 | 2 6 | 3 0 | 4 | 10 | 1 | 2 8 0 |
| | (*b*) Removing *vel*... ... | 10 | ... | 2 6 | ... | 2½ | ... | ¼ | 0 6 3 |
| | (*c*) Removing ground-nuts ... ... ... | 20 women. | ... | 1 6 | ... | 50 women. | ... | 2½ | 4 11 0 |
| | (*d*) Cartage to occupant's house ... ... ... | ... | ... | ... | ... | ... | ... | ... | 0 12 0 |
| XI | *Balutas* (12 in number) ... | ... | ... | ... | ... | ... | ... | ... | 1 4 0 |
| | Total ... | ... | ... | ... | ... | ... | ... | ... | 56 7 10½ |
| | | | | | | | | Therefore cost per acre ... | 52 8 9¾ |

The whole field measures 21 acres and 9 gunthas, of which 1 acre and 3 gunthas was under groundnut. Over this area 10 cart-loads of farmyard manure were spread and 300 sheep folded during three nights. The crop, according to figures stated, would realize Rs. 159-11-7, showing a clear profit of Rs. 95 per acre, but prices were abnormally high. The crop was grown on rich black soil assessed at Re. 1-15-8 per acre. It was watered eight times from a well which was recently dug. The land was deeply ploughed in the hot weather and 96 lbs. per acre of seed (a high rate) was drilled in the rains. The crop ripened in January, being meanwhile once bullock-hoed and three times hand-weeded. The crop produced 4,032 lbs. per acre of unhusked nuts (*shenga*) equal to 3,024 lbs. husked nuts (*dáne*). The haulm, termed *vel* (a useful fodder), was estimated to be worth Rs. 10 per acre.

*Mr. C. G. H. Fawcett, Assistant Collector.*

Sends in one carefully reported test (No. 49) on groundnut. The field selected forms part of a Deshmukhi *inám* land which pays a *judi* of annas 5 in the rupee. Of the total area (4 acres 15 gunthas) one acre and two gunthas is classed as dry-crop and the rest *bágáyat*. It is, however, curious to note that the rate of assessment on the dry-crop portion is higher than that on the garden land even after inclusion of the water-cess, Rs. 15. The plot experimented upon is watered by a *pát* fed by a *dharan*, the occupant's turn occurring every 18th day. The crop, however, was watered only twice and this reduced the yield to 12 annas (though estimated at 16 annas). The field was liberally manured with farmyard manure and sheep folding, a favourite practice for this crop. The incidence of assessment is 7·29 per cent., and would have been higher if ordinary market rates had ruled. The fodder, 3,460 lbs. per acre, is estimated to be worth Rs. 15 owing to the same high rates consequent upon the prevailing scarcity.

*Mr. T. D. Fry, Assistant Collector.*

Submits a groundnut and a sugarcane test. The groundnut experiment (No. 50) is not satisfactory. The crop was grown on rich brown soil assessed, soil and water-rate together, at Rs. 6-1-3 per acre. The outturn of nuts in shell comes to 345 lbs. per acre, about one-tenth of a fair crop, attributed to deficient rainfall. The seed, about half the usual quantity, was broadcasted. This prevented bullock-hoeing, and hand-weeding seems to have been neglected. The cultivation was admittedly careless and experiments on fields badly managed should be avoided.

For the sugarcane test (No. 51) the experimenter selected a holding in one of the hill-side villages of Jávli, where sugarcane does not thrive so well as in the Desh. The field gets water twice a month throughout the year from a *dharan* fed by a *ńála*. This would not suffice for sugarcane, which requires watering every eighth day. The rainfall was poor and the crop suffered accordingly. Estimated at eleven annas it only yielded 1,948 lbs. of *gul*. The date of planting is not given, but the results indicate that the crop was not fully ripe when harvested, the percentage of tops to cane (about 33 per cent.) pointing strongly to this conclusion. When water fails this course often becomes necessary, and the practice has been frequently noted. The experimenter's results are summarized for comparison with other tests as under :—

| | | |
|---|---|---|
| Number of canes cut ... ... ... | 25,430 | per acre. |
| Weight of canes topped .. ... ... | 18,034 lbs. | „ |
| „ „ tops ... ... ... | 9,017 „ | „ |
| „ „ juice ... ... ... | 10,460 „ | „ |
| „ „ *gul* ... ... ... | 1,948 „ | „ |
| Percentage of juice to topped canes ... ... | 58 | |
| „ *gul* to juice ... ... | 18·6 | |
| „ *gul* to cane ... ... | 10·8 | |

# SOUTHERN DIVISION.

## Belgaum.

Four ordinary experiments on rice have been reported from this district, three by Mr. DuBoulay and one by Mr. Brown. One of the three Mr. DuBoulay intended to be special, but the opportunity was lost. Mr. Brown conducted two ordinary tests in December, but did not report them. The Collector called for the papers but only one experiment was recovered, the papers regarding the other being missing. The District Deputy Collector was asked to conduct tests in linseed, but the crop failed owing to seasonal causes. No experiments on second crops of rice fields could be effected, owing to the same cause.

*Mr. J. H. DuBoulay, Assistant Collector.*

Submits three ordinary tests (Nos. 52—54) all on rice, each crop raised from seed drilled by a six-coulter drill, the seed-rate being in each instance 92 lbs. per acre. Each field is stated to have been manured with cowdung and green grass after the crop was sown, a statement probably erroneous. All three fields have red soil, assessed at about equal rates, Rs. 5-1-0 to Rs. 5-9-3 per acre. The crops were purely rain crops excepting the third, which had the untaxed advantage of an occasional flooding from an adjoining tank. The rainfall was unseasonable though not short. Each field grows the same variety of rice, *dodd bhatta*, and usually carries a second crop *vál*, but this year insufficient moisture remained in the soil to allow of a second crop being taken.

The third test gave the best results. The cultivation of this field is described as good, that of the other fields as indifferent. The crop, which must have been much under-estimated at 13 annas, gave an outturn of 3,025 lbs. grain in husk per acre. The seed was sown at the end of May and the crop was ripe in November. Prices went up with a run soon after the experiments were taken, so that the value of produce recorded is probably a good deal less than the actual prices obtained this year by the cultivator.

The outturn of rice in the Khánápur táluka, where these tests were taken, was only 10 annas, and the crops selected must have been considerably over average. The yields given are from 2½ to 3½ times those of the formulæ which place the highest outturn for drilled rice at 2,000 lbs. Under the circumstances I should suspect these crops to be plantation rice, had not the experimenter distinctly stated it to have been drilled in each of the three tests.

*Mr. C. D. Brown, Assistant Collector.*

The rice experiment conducted by this officer was submitted by his successor Mr. Boyd and received in this office only at end of November last. I feel some hesitation in recording the results. The field selected grew rice continuously "mixed with $\frac{1}{144}$ part of tola *hingári* or rabi crop". This remark is not understood. The land was manured with three cart-loads of cowdung per acre, a rather low rate, a month before sowing; and rice was drilled directly at end of June, not rábed or transplanted. The rain, on which the crop depended, is described as untimely. The estimate of 37 lbs. seed per acre is very low, the general average, according to the formulæ, being 100 lbs. The crop yielded 688 lbs. of paddy and 1,480 lbs. straw per acre, estimated by the experimenter at only 5 annas, but, compared with the formulæ standard, it must be valued at 10 annas at least. The value of the crop came to Rs. 29-14-8 and the percentage incidence to 18·43, which, considering the high prices prevailing, seems extraordinarily high. No sample was sent to this office as required by standing orders. The report is altogether meagre and under all circumstances I must exclude this test.

## Bija'pur.

Only a part of the programme could be followed in this district, the tests reported being all in *khapli* or *jod*, an irrigated wheat. Neither Mr. Hervey, the Second Assistant, nor Mr. Deshpánde, District Deputy Collector, made any experiments. As early as the 8th of October, Mr. Davidson, the Collector,

wrote:—"The season, however, has been such an extraordinary one, there only being sufficient rain to keep the crops alive without allowing them to come forward, that even now, though they are green and fairly healthy, I am unable to judge whether they will be moderate crops or absolute failures." Later on (11th June) he says that "owing to the failure of crops it was found impossible to make any experiments that would have been of any use, and with crops as a rule averaging 2 and 3 annas, the time spent on them would have been thrown away and the results would have been of no use."

*Mr. W. C. Rand, Assistant Collector.*

This officer sends two careful tests (Nos. 55 and 56) of spelt wheat grown on fields classed partly as dry-crop and partly as garden land, though usually growing a dry-crop unless when the season is unpropitious, as in the present instance. Each field was manured in the hot weather of 1891, and, as the fields remained fallow till November, the inference is that with a favourable rainfall the cultivators had intended taking kharif crops. The tests deserve careful analysis and comparison. The actual tillage operations are not recorded, but in each case the cultivation is described as good. The field in the 1st test (No. 55) had the advantage of sheep being folded on it, but whether the droppings were sufficient to furnish a liberal manure is not stated. 95 lbs. seed per acre broadcasted in November grew into a 20-anna crop which was harvested at end of February and produced 1,168 lbs. husked grain per acre. 70¾ measure sers of grain in husk produced 31¾ measure sers of clean grain. For this crop a full supply of well water was available. The soil is red-black (*maddi*) and is assessed at Re. 1-6-10 per acre. The second field (No. 56) bears an assessment of Rs. 2-6-11 per acre, the soil being light in colour, locally termed *mardi*. This field was liberally manured with cowdung, 30 cart-loads per acre. I doubt the accuracy of the seed-rate; 210 lbs. per acre is an excessive estimate even for an irrigated spelt crop. The field grew chillies and late *jowári* during the last two years. Broadcasted in November, the crop was reaped on the 1st of March and produced 1,137 lbs. of grain worth, without by-products, Rs. 55-5-0 per acre. The value returns of both fields are of course raised by the famine rates prevailing. The straw and chaff, of low value as fodder, are usually unsaleable, but the experimenter notes that in a season like that of 1891-92 they would probably fetch a price. However, he has not valued them, though Mr. Cursetji in the next experiment values the by-products (apparently too highly) at Rs. 8 per acre. 73¼ measure sers of grain in husk from the 2nd field gave 31½ measure sers of clean grain.

*Mr. J. M. Cursetji, District Deputy Collector.*

This officer's test (No. 57) on *khapli* (spelt) wheat furnishes some useful information not recorded in Mr. Rand's experiments (Nos. 55 and 56). Mr. Cursetji shows that a measure ser of grain in husk, weighing 51 tolas, gives 40 tolas of clean grain and 11 of husk. The experiment was taken on a field having an entire area of 17 acres 16 gunthas, of which 7 acres is garden land. The whole is assessed at Re. 1-5-6 per acre, but is sublet by the registered owner at about Rs. 7 per acre. The tenant has the full use of a large well which apparently gives water sufficient for the whole of the garden land. The wheat occupies the same area always; the sugarcane and other crops are rotated. The seed-rate figures corrected in my office show that 104½ lbs. grain in husk was broadcasted in *Ashvin* (September—October) immediately after an application of 13 loads ordinary manure.

The crop, estimated at 14 annas, produced 1,381 lbs. per acre grain in husk, equivalent to 1,084 lbs. clean grain. The straw and chaff weighed 1,161 lbs. per acre. This, with the principal product, had a gross money value of Rs. 73-5-8. The experimenter values the by-products at about Rs. 8 per acre. Ordinarily the straw and chaff of this wheat (*khapli*) is not used as fodder. Though it must have been used in the present year owing to scarcity of fodder, the value put upon it seems rather high (about 144 lbs. per rupee). The incidence of assessment is lowered by the high rates of value during the year.

Mr. Cursetji attempts to estimate the profits from the whole field; but his calculations are based on hearsay evidence and at the best are only approximate. The test is, however, carefully made and well reported.

## Dharwar.

Three officers from this district send one experiment each. Of these, two are on *navani* in the *mallád* and one on sugarcane. Thus the programme was only partially followed. Neither Mr. McNeill nor Mr. Kánga, District Deputy Collector, made any experiments. The latter was exempted as the crops in his charge were generally failures. In the eastern parts of the district this was largely the case everywhere, and Mr. Enthoven was from this cause prevented from carrying out the prescribed experiments.

*Mr. R. Knight, Assistant Collector.*

Sends one test on *navani* or Italian millet. The experimenter observes that *navani* is grown to a very small extent in Dhárwár and he had considerable difficulty in finding out a field under it. But during the year under report it occupied 73,700 acres in the Dhárwár district, of which no less than 8,900 acres were in this táluka. Dhárwár stands first in the Presidency in respect of this crop, as it occupies one-third of the total area cropped under this cereal. The soil was mixed red and black, assessed at Rs. 2-4-3. The cultivation of this staple is mainly confined to the poorer soils of the *mallád*, and this experiment is therefore not a representative one. Moreover, the rule as to minimum area of test has not been observed. The grain is not a luxury as reported, being a staple food-grain of the poorer classes, though occasionally used in the preparation of richer mixed foods.

The experimenter first selected three patches to represent the average of the field; afterwards he considered that the two best plots fairly did so. On this assumption the outturn of grain comes to 201 lbs. per acre, which, with the fodder, had a market value of Rs. 6-11-4 per acre. This classes the crop at 9 annas. Taking 16 annas as a bumper, the experimenter classes it at 6 to 8 annas, but raises his estimate to 14 annas with the standard of a bumper at 20 annas. These proportions, however, vary and the estimate is apparently meant to be 8 to 10 annas. The seed, 1½ lbs. per acre, an abnormally low rate, ordinarily drilled in June-July, was not got into the ground until the end of August. The season was abnormal and I attach so little value to the figures reported that the experiment must be excluded.

*Mr. R. E. Enthoven, Assistant Collector.*

Sends a sugarcane test (No. 58), a test always entailing a good deal of labour. This officer's test was made under close personal supervision and is well reported. The crop was grown on an average black soil field below the large Hirekerur irrigation tank. The crop was not quite even and was cut in two plots, that in the centre of the field yielding a much larger outturn of *gul* than the other taken in a low-lying corner. An average of the return from each shows the produce per acre to be 3,590 lbs. of *gul*. The top ends of all large canes appear to have been saved for sets for replanting. This, an economical practice, somewhat reduced the outturn of *gul*. About 20,000 top ends were saved from one acre sufficient to give sets for an equal area. The crop is estimated at 18 annas, but it does not reach that standard. Near Poona, where the cost of manure alone exceeds the total cost of production of this crop, it would have been estimated at 9 annas. Mr. Enthoven's estimate of sets planted is not correct, as the price indicates that 3,000 canes and not sets were used in planting an acre; 16,000 to 20,000 sets are always required.

| | | Rs. | a. | p. |
|---|---|---|---|---|
| The experimenter estimates the by-products to be worth | ... | 26 | 14 | 0 |
| *Add* value of *gul* | ... | 210 | 0 | 0 |
| Total | ... | 236 | 14 | 0 |
| *Deduct* estimated cost of production | ... | 88 | 5 | 10 |
| Profit per acre | ... | 148 | 8 | 2 |

The land is assessed at Rs. 7-8-0 per acre and was by no means liberally manured with 5 cart-loads per acre of cowdung and sheep folded on the field for two days before planting. The cultivation was only fair. The crop gave evidence of insufficient weeding and the field was only once ploughed. I cannot

accept the experimenter's estimate of cost of production. Some of the details are approximately right, others are clearly wrong. One item is conspicuously high, *viz.*, cost of spreading 10 loads of manure, Rs. 5. The crushed canes and stripped leaves ordinarily do furnish sufficient fuel in the boiling process. It is not stated whether the green tops provided a surplus besides full fodder for the cattle working the mill as is usual.

*Mr. C. C. Boyd, Assistant Collector.*

A good experiment on Italian millet (No. 59) is reported by this officer. The conditions of cultivation and yield per acre were nearer average than those of Mr. Knight's test. This staple is a five-month crop grown by the poorer cultivators on light land. It affords an early provision of food for themselves and fodder for their cattle, and is especially useful in years of scant rainfall. The crop was grown on red land assessed at Re. 1-6-10 per acre, growing *jowári* and *navani* in alternate years. The field gets a light dressing of manure every year and the cultivation may be characterised as fair. About 8½ lbs. seed drilled in August produced a crop in December estimated at 12 annas, but 14 annas according to the formulæ. It yielded 422 lbs. grain (bushel weight 56 lbs.) and 1,950 lbs. chaff and *kadbi* per acre. The season was not unfavourable at the place of experiment and an influx of cattle from the distressed parts to the *mallád* raised the price of fodder considerably; still the gross value per acre only amounts to Rs. 12-11-3 with a percentage incidence of 11·23 which under the circumstances is rather high.

## Kolába.

Four experiments have been received from this district, all on transplanted rice, three by Mr. Orr and one by Mr. Bhúngáonkar. The latter officer was asked by the Collector to conduct a special experiment and his explanation of his omission to do so is regarded by the Collector as unsatisfactory. Mr. Orr states that he could not undertake tests in second crops after rice, because, as he says, they are rare in the neighbourhood of Roha (where he conducted his rice experiments) and this year particularly so on account of failure of late rains.

*Mr. J. P. Orr, Assistant Collector.*

Three well conducted tests on sweet rice in Roha are reported with unusual exactness and appreciation of practical details. This officer's tests had the object of gauging the comparative effect of good and inferior ráb practice, *i.e.*, to compare the effect of a liberal application of cowdung ráb on the seed-bed with a less quantity of cowdung supplemented by brushwood, grass or other forest litter. The results were not conclusive owing to the fact that, as the experimenter says, "it is very difficult at so distant a date to get from the cultivators accurate and trustworthy information as to the materials they used, and I should not again attempt such an experiment without having watched the rábing process from its commencement in January or even earlier." He says that rábing with leaves and grass alone, common in the Thána district, is unknown in Roha, cowdung being invariably used with superposed layers of other material. The quantity of material used seems to be the chief factor.

The field in the first test (No. 60) has good soft soil, a foot deep, and grows rice every year. With good cultivation and a most favourable season the crop is estimated at the bumper standard (but 16 annas according to the formulæ). A seed-bed of 2 gunthas had the following ráb material laid upon it:—

| | | |
|---|---|---|
| December 1890 | ... | 40 small baskets of cowdung spread; |
| January 1891 | ... | 140 small bundles of rice straw,<br>4 head-loads of chaff, and<br>4 do. grass piled in succession. |

Sifted earth was sprinkled over this and moistened with water. The whole was burnt at end of January. With a seed-rate of 56 lbs. per acre, broadcasted in June, the bed gave seedlings sufficient for 17½ gunthas. This is a ratio of 44 gunthas seed-bed per acre of transplantation. The field is assessed at Rs. 6-4-7. The crop was harvested on 23rd October and produced 2,403 lbs. grain in husk and 1,915 lbs. straw per acre.

The 2nd field (No. 61) with shallow soil (*murum* within 8 inches of surface) is assessed at Rs. 4-14-7. Excepting management of seed-bed, other conditions of cultivation, &c., were identical with the former test.

On the 3¾ guntha seed-bed a thin layer of cowdung with grass, straw, and earth layers above it was burnt in February. 44 lbs. seed per acre, broadcasted in June, provided seedlings sufficient for 35 gunthas of transplantation. In view of the inferior character of the soil the experimenter estimates this crop also at the bumper standard (14 annas according to the formulæ). It produced 1,953 lbs. grain and 1,926 lbs. straw per acre. The incidence of assessment is slightly less than that in the previous test.

Mr. Orr's third test (No. 62) brings out facts of importance. The field was selected because it was known that the seed-bed had been well rábed. No comparison can, however, be instituted between this and the previous two tests, as subsequent to the experiment it was found that the field is reclaimed *varkas* land, the cultivator spending Rs. 60 on 1½ acres on the reclamation during the last eight years. The assessment is only annas 4 per acre. This class of land requires a proportionally larger seed-bed than ordinary rice land, *viz.* 8⅔ gunthas for 1 acre of transplantation, and the seed is more sparsely scattered, at a rate of about 60 lbs. per acre. On a 3¼ guntha seed-bed the following rább material was used :—

February 15th to 29th...(1) Dung of 19 cows and bulls, collected by cowherd during 15 days forming a thick lower layer,
End of March ... ...(2) 30 head-loads of grass forming a layer 4 inches thick,
April 3rd ... ... ...(3) Earth moistened with water, forming an upper layer, put on immediately before burning.

The crop was harvested on 26th October and produced 1,916 lbs. grain and 1,816 lbs. straw per acre. This crop also is estimated at the bumper standard (14 annas according to formulæ).

*Mr. K. N. Bhángáonkar, District Deputy Collector.*

Forwards one test (No 63) on transplanted rice. The figures are worked out with care, but the report is wanting in detail. It is not clear whether the seed-bed or the field was manured; 7 cart-loads per acre were applied in April-May, presumably to the latter. The experimenter failed to ascertain the seed-rate with accuracy. The area of seed-bed per acre of transplantation is not given and without that datum I do not see how the experimenter arrived at his figures.

The land is assessed at Rs. 5-11-2 per acre and grows sweet *halva* rice every year. With a favourable year and good cultivation the outturn, 2,547 lbs. grain in husk and 2,943 lbs. straw per acre, is estimated at the bumper standard. The incidence of assessment is not high and might be lowered by growing a secondary crop.

## Ratnágiri.

*Mr. A. M. T. Jackson, Assistant Collector.*

Two tests by this officer furnish information which supplements that obtained last year regarding coarse hill millets grown on upland *varkas* land. Mr. Jackson's experiments were taken on two *nágli* crops, one grown from transplanted seedlings, the other from seed broadcasted in the field. The results prove that a rábed seed-bed is as advantageous in *nágli* cultivation as for rice.

The first crop tested (No. 64) was grown from seed broadcasted in June, 22½ lbs. per acre *nágli* with a slight sprinkling of *vari*; a higher seed-rate than last year's tests indicate as general. The field was fairly manured with goat droppings and cowdung. With an indifferent season and fair cultivation the outturn is estimated at 10 annas and amounts to 542 lbs. grain and 637 lbs. straw per acre. The estimate is evidently based on the capabilities of such land under the conditions of cultivation described. This field appears only to be able to grow *nágli* followed by *harik* after five years' fallow. After two years' cropping it is again fallowed. The field was three times ploughed before the seed was sown in June. The crop was ripe in November.

The second test (No. 65) was taken on land assessed slightly higher and cultivated by a tenant. The seed-bed was rábed with cowdung, tree loppings and grass. The proportional area of seed-bed to area of transplantation was 8⅓ gun-



8268

thas to an acre. Seed at the rate of 3 lbs. per acre was broadcasted after once ploughing the seed-bed; while the seedlings were growing, the rest of the field was ploughed four times. Six weeks after sowing, the seedlings were transplanted into holes made at regular intervals presumably in the ordinary way with a pointed stick. A piece of dried fish, *kuta*, half filled each hole. The crop was harvested on 23rd October and produced 1,348 lbs. grain and 2,092 lbs. straw per acre. This crop is evidently under-estimated at 12 annas, judging by the tests of last year and by other tests this year.

*Nágli* is usually stacked for some months to improve the quality of the straw. It is then threshed either by flailing with sticks or by treading with bullocks.

*Mr. L. N. Ajgáonkar, District Deputy Collector.*

This officer, whose tests last year furnished a good deal of useful information regarding the hill millets, has again experimented upon the same crops. Regarding the peculiar methods of cultivation there is little to add to the description given in the report of 1890-91. The area in the first two tests falls short of the prescribed minimum. To avoid this he forms them into one test; but though the fields form part of the same survey number, the *phálni* numbers are different and bear different rates of assessment. There are also differences in treatment, cultivation and outturn. They may, however, be admitted as they supplement the information recorded last year.

Mr. Ajgáonkar's first test (No. 66) is taken on *nágli* grown on sloping land so steep that heavy rain washed away the dressing. A 7-guntha seed-bed broadcasted with 5½ lbs. seed furnished seedlings sufficient for one acre. A top dressing of fish manure was applied to the field when the seedlings were transplanted. It is not clear whether this manure was washed away by heavy rain or the ráb from the seed-bed. The field is assessed at Re. 0-3-9 per acre and grows *nágli, vari* and *harik* after 7 years' fallow. The crop, carelessly cultivated and not weeded, produced only 427 lbs. grain and 920 lbs. straw, too highly estimated at 13 annas.

On a level field with stony soil, *nágli*, the subject of this officer's second test (No. 67), gave much better results. This land after three years' fallow grows during the next three years *nágli* followed by *harik* and *vari*. It is assessed at Re. 0-4-1. The seed-bed and seed-rate were proportional to those of the first test. The seedlings were transplanted into holes with, as usual here, a piece of dried fish placed in each hole, 10 maunds per acre of dried fish *(kuta)* being applied in this manner. The crop was ripe on the 6th November and produced 845 lbs. grain and 1,344 lbs. straw. It is not understood on what principle the experimenter gives this crop the same anna valuation as the last, unless it be that because the field is flat it is less liable to be swept by flood water and consequently more valuable.

The recuperative value of lengthened periods of rest to *varkas* lands is borne out by a third test (No. 68) also on *nágli*. The land is said to have lain waste for 35 years and during that period presumably furnished ráb from scrub growth and grass, besides grazing. Preparatory to tillage the scrub (*kaval*) was cut, laid regularly over the whole area, and when dry was burnt. The land is assessed at Re. 0-3-6 and owing to its slope was dug by hand in place of ploughing. Seed was broadcasted a month before the monsoon at about 12 lbs. per acre. The crop was weeded thrice, once in July, once in August when blanks were filled up, and again in September. The crop was harvested on the 9th of November. In a favourable season the produce, 867 lbs. grain and 1,660 lbs. straw per acre, classes the crop according to local estimate as a 12-anna one.

Mr. Ajgáonkar's fourth *nágli* test is omitted. It is admitted that the crop was damaged by cattle trespass, and it should not have been selected for experiment.

Two further tests deal with *harik*. The first crop (No. 69) was grown on land assessed at 5 annas per acre which grows *nágli, vari* and *harik* after a five or six years' rest. The second crop was raised on rocky land assessed at Re. 0-3-1, which grows *nágli, harik* and *vari* after a similar fallow. Each field was unmanured and broadcasted with equal seed-rates, 12 lbs. per acre. This

rate does not tally with that given for similar crops by the same officer last year (61 lbs. per acre), the present rate being probably about right. The rate given by the formulæ is 9 lbs.

The higher assessed land produced 834 lbs. grain, the other 487 lbs. per acre. These figures class the crops at 14 and 12 annas respectively. The cultivation was good, but rainfall short, both crops suffering from this cause. The inferior crop suffered further from a poisonous weed *agya*, which is most troublesome in years of scant rainfall.

## Kanara.

Only one officer, Mr. Hudson, submits experiments from this district. Mr. Divátia explains that his late arrival in the district (20th January) and the exigencies of his tour prevented him from securing a suitable crop. No explanation has been received as to Mr. Sheppard's failure to experiment.

*Mr. C. W. Hudson, Assistant Collector.*

Submits green gram and sugarcane tests. The tabulated figures showed errors of calculation which were corrected in my office.

Green gram (No. 71) was a second crop after rice. The cultivator grows double crops of rice for two consecutive years, and in the third year substitutes a pulse for the second rice crop. Hardly enough moisture remained in the soil to mature the gram properly, but the outturn (450 lbs. pulse per acre) was not low. The incidence of assessment is necessarily high, being on a second and subsidiary crop. The cultivator probably looks less to the outturn than to the well understood ameliorating influence of leguminous crops, which leave in the soil a residue of recognised manurial value to the cereal crop (rice) next taken.

Mr. Hudson reports a novel method of utilizing the chaff of green gram. He says: "The dry husks or *hottu* are mixed with grass and soaked for a couple of days or so in water. The fodder thus yielded is most nutritive and valuable in a tract of country where grass by itself is so poor."

Mr. Hudson's second test (No. 72) is taken on sugarcane, grown on rice land assessed at Rs. 4-4-8 per acre. A *nila* available for irrigation skirts the field. The whole plot of cane grown on this particular number was tested. The area is less than the minimum allowed by standing orders, but under the circumstances this need not be objected to, more especially as headlands of sugarcane are almost invariably damaged by theft, jackals and rats, due allowance for which is difficult in testing a large crop. The crop was near a dwelling and for this reason got more attention and was less open to damage than a crop growing in a remote field. The field carries double crops of early rice and sweet potatoes in three consecutive years followed by sugarcane during next two years. The crop tested got evidently every attention and was liberally managed, but I cannot follow the experimenter in his details of cultivation and of estimated cost. The crop may have been a ratoon crop, *i.e.*, grown from the stools of the previous crop; otherwise the preparatory tillage in removing old stumps, in ploughing, and in preparing the land for replanting, would have cost much more than the sum shown in the report. The item for planting sets conflicts with this, unless it refers to filling blanks with sets, and then the charge is much too high.

The results of the test work out as under :—

| | Yield from 2¾ gunthas. | Acre rate. |
|---|---|---|
| Number of canes ... ... ... | 1,784 | 26,760 |
| Number of canes each furnishing from top end a "seed top" or set for replanting. | 1,425 | 21,375 |
| | lbs. | lbs. |
| Weight of juice ... ... ... | 3,200 | 48,000 |
| Weight of green tops ... ... | 568 | 8,520 |
| Weight of liquid jaggery ... ... | 618¾ | 9,283 |
| Percentage of above to juice ... ... | | 19·34 |

| | Value per acre. Rs. a. p. |
|---|---|
| Value of liquid jaggery ... ... ... | 292 8 0 |
| Value of seed tops (estimated at double the ordinary rate) ... ... ... ... | 85 8 0 |
| 8,520 lbs. of green tops not valued by experimenter, worth, say ... ... ... ... | 12 0 0 |
| Dry leaves, crushed canes, all utilized as manure, also not valued; say ... ... ... | 15 0 0 |
| Total ... | 405 0 0 |

Liquid jaggery must of course weigh more than *gul*, the usual product, but what the proportional weights would be is not known. The cultivator, it is interesting to note, used wood and brushwood as fuel in the boiling process, rather than utilize the dry leaves and crushed cane for this purpose. These he spreads over the cropped area and burns as an inferior rab. The crop tested was partially manured in this manner with the litter of the previous crop. This was done probably before the plough was used to stir the soil between the rows (if the crop was a ratoon one), although the experimenter says after, but the report leaves this in doubt. A little before the rains set in, a further top dressing of mixed cowdung and leaves was given, and at the same time the ash of earth and rubbish burnt together (*sudádhulu*) was applied.

The crop was only once weeded. The leaves were wrapped thrice. This practice lessens damage by jackals and renders the crop less liable to be lodged by heavy rain or wind.

The following is the experimenter's estimate of cost of production, but I cannot accept the figures as at all accurate:—

| Charge for 2½ Gunthas. | | Per acre. | |
|---|---|---|---|
| *Details of Cultivation.* | Rs. a. p. | Rs. a. p. | |
| 1 Ploughing, 2 pairs of bullocks with two men for one day. | 0 12 0 | 11 4 0 | |
| 2 Levelling, 2 men for one day ... ... ... | 0 6 0 | 5 10 0 | |
| 3 Manure— | | | |
| Cowdung ... ... ... ... | 0 8 0 | 7 8 0 | |
| 2 men preparing manure (*sudádhulu*) ... ... | 0 6 0 | 5 10 0 | |
| 4 Sowing— | | | |
| Cost of seed (¼ of the initial cost) ... ... | 2 0 0 | 30 0 0 | |
| 2 coolies for one day ... ... ... | 0 6 0 | 5 10 0 | |
| 5 Fencing, fence used for 5 years and cost Re. 1-14-0 ... | 0 6 0 | 5 10 0 | |
| 6 Weeding and wrapping canes in their leaves— | | | |
| 8 coolies working one day ... ... ... | 1 8 0 | 22 8 0 | |
| 7 Watering 2½ months on alternate days, 4 hours' work a day ... ... ... ... ... | 3 8 3 | 53 11 9 | |
| 8 Watching, no cost incurred being near home ... | ..... | ..... | |
| 9 Cutting canes, 4 men one day ... ... ... | 0 12 0 | 11 4 0 | |
| 10 Milling canes and making jaggery— | | | |
| Hire of bullocks and 4 men... ... ... | 1 8 0 | 22 8 0 | |
| Hire of pan ... ... ... ... | 0 8 0 | 7 8 0 | |
| Firewood, 4 men fetching one day ... ... | 0 12 0 | 11 4 0 | |
| | 13 4 3 | 198 15 9 | |

# TABULAR SUMMARIES.

*Summary of Crop Experiment*

O. S.=Original Survey;

| No. | District, Ta'luká, Village and Experimenter. | Crop and date of Experiment. | Local Estimate, in Annas. | Yield according to Formulæ. | Average per Acre. | | | | | | Area of Test. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Seed. | Yield of | | Total Value of Produce. | Assessment, excluding Local Funds. | Incidence of Assessment on the Value of gross Produce. | |
| | | | | | | Principal Product. | By-product. | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | **AHMADABAD.** *Mr. G. S. Curtis, Assistant Collector.* | | Annas. | Lbs. | Lbs. | Lbs. | Lbs. | Rs. a. p. | Rs. a. p. | Per cent. | A. g. |
| 1 | Daskroi (Dariápur Kájipur) *Mr. Bamanji Edalji Modi, District Deputy Collector.* | Wheat (Vájia), 9th March 1892. | 11 | 1,000 | 164 | 2,051 | 25 bundles. | 76 4 0 | 5 12 2 R. S. | 7·55 | 0 4 |
| 2 | Dholka (Saroda) ... ... | Rice (Sutarsál), 11th November 1891. | 15 | 1,825 | .. | 1,526 in husk. | 1,680 | 41 4 8 | 4 0 0 R. S. | 9·68 | 0 5 |
| 3 | Sánand (Visálpur)... ... | Do. 24th November 1891. | 14 | 1,710 | 19¾ | 1,042 Do. | 1,768 | 29 11 4 | 6 5 10 O. S. | 21·42 | 0 5 |
| 4 | Sánand (Sánand) ... ... | Do. (Kamod), 27th November 1891. | 12 | 1,460 | 20 | 951 Do. | 2,460 | 40 12 6 | 5 4 6 O. S. | 12·95 | 0 4 |
| 5 | Do. do. ... ... | Do. (Sutarsál), 27th November 1891. | 14 | 1,710 | 20 | 1,561 Do. | 2,050 | 52 8 10 | 5 13 10 O. S. | 11·16 | 0 4 |
| | **KAIRA.** *Mr. H. R. Cooke, Collector.* | | | | | | | | | | |
| 6 | Mátar (Ratanpur)... ... | Kodra (Paspalum scrobiculatum) with a sprinkling of tur and juvár, 5th November 1891. | 10 | 845 | 15 | 1,003 | ... | 23 6 2 | 4 0 0 O. S. | 17·10 | 0 8 |
| 7 | Mátar (Wansar) ... ... | Bávto (Eleusine coracana) with a sprinkling of juvár and red juvár, 6th November 1891. | 12 | 1,240 | 2 | 1,300 | ... | 33 15 4 | 2 12 1 O. S. | 8·11 | 0 8 |
| 8 | Mehmadabad (Kaira) ... | Kodra (Paspalum scrobiculatum) with a sprinkling of sheria, bhendi, tur and red juvár, 9th November 1891. | 6 | 450 | 10⅜ | 763 | ... | 18 10 7 | 3 8 3 O. S. | 18·84 | 0 8 |
| 9 | Do. do. ... | Bávto (Eleusine coracana) with a sprinkling of cotton and red juvár, 9th November 1891. | 12 | 1,010 | 3 About | 1,299 | ... | 36 14 5 | 4 1 3 O. S. | 11·05 | 0 8 |

R. S.=Rovision Survey.

| Equivalent in Tolas of local measure Ser. | Prices of produce per Rupee. Grain. | Prices of produce per Rupee. By-product. | Remarks. |
|---|---|---|---|
| 13 | 14 | 15 | 16 |
| Tolas. | Lbs. | Cwts. | |
| Weight Ser = 40 | 29$\frac{1}{2}$ | 3$\frac{1}{8}$ bundles. | *Experiment No. 1* :—Wheat, *vájia* (soft-red), on a *gorádu* soil manured with 20 cart-loads of cowdung and watered by means of a well. The crops grown during the two previous years were :—(1) *bájri* and barley and (2) vegetables and maize. Cultivation good. Crop a full bumper but estimated at 11 annas only. By-product not weighed though value included in column 9. Seed-rate higher than that in the formulæ. Incidence on the second crop only. |
| Do. ... | 41 in husk. | 3$\frac{5}{8}$ | *Experiment No. 2* :—Rice, *Sutarsál*, on a *besar* soil growing annually rice followed by barley. Usually manured with 8 to 16 cart-loads of farmyard manure but none put in this year. Cultivation good but the late rains being deficient the crop had to be irrigated from a well three times at intervals of 10 days. Seedlings purchased and seed-rate not known. Yield estimated at 15 annas (equal to 1,825 lbs. according to formulæ) but actual yield low. Incidence of assessment on the 1st crop alone. |
| Do. ... | Do. ... | Do. .. | *Experiment No. 3* :—Same variety on a *gorát* (sandy loam) soil growing continuous rice but occasionally barley also. Not manured this year. The crop suffered as elsewhere from deficient rain and was watered four times from a well at intervals of 15 days. The well-water was brackish and is said to have injured the quality of grain slightly. Area of seed-bed not ascertained. Yield much below the formulæ. Incidence of assessment high, partly explained by a poor crop. |
| Do. ... | 27$\frac{3}{8}$ Do. | Do. ... | *Experiment No. 4* :—Rice, *kamod*, on *besar* land newly brought under cultivation and irrigated from the *saran* or low-lying ground of an adjacent tank. Manured with 15 cart-loads of farmyard manure per acre before sowing. Actual yield much below the formulæ, attributed to deficient watering, which also affected the quality of the grain. The proportion of straw unusually high. Area of seed-bed not known. |
| Do. ... | 32$\frac{7}{8}$ Do. | Do. ... | *Experiment No. 5* :—*Sutarsál* rice on a simllar land with equal facilities for irrigation. Manured as above. Yield below that of the formulæ but not so low as in the previous test. |
| Do. ... | 51$\frac{1}{2}$ | ... | *Experiment No. 6* :—*Gorádu* soil manured with 10 cart-loads of cowdung per acre and apparently growing only one crop. Rotation undefined but for the las three years the crops were :—(1) hávto, (2) juvár, and (3) castor. Cultivation bad. Crop below average of the táluka. Test vitiated by weighing crop when wet. Incidence high. Value of chaff and also of subordinate pulse included in column 9. |
| Do. ... | 43 | ... | *Experiment No. 7* :—Similar soil but not manured. Crops during last three years were :—(1) *kodra*, (2) *juvár*, and (3) *bájri*. Cultivation good, but crop below average. Figures untrustworthy owing to the cause stated above. By-products valued, though not weighed. Value of subordinate grains included in column 9. |
| Do. ... | 51$\frac{1}{2}$ | ... | *Experiment No. 8* :—*Besar* soil on which *juvár* grown continuously for the last five years without any manure. Land much exhausted. Cultivation good, but season not favourable. Incidence high, value of by-product and sprinklings entered in column 9. Figures not accurate for reason stated under test No. 6. |
| Do. ... | 43 | ... | *Experiment No. 9* :—*Besar* soil growing *hávto*, *kodra* and *bájri* in rotation. Manured with 5 cart-loads of street sweepings in May before sowing. Value of sprinklings (Rs. 5-7-6) included in column 9. Crop up to the average of neighbouring fields ; figures here also vitiated by the crop being weighed wet. |

*Summary of Crop Experiment Reports,*

O. S. = Original Survey;

| No | District, Ta'luká, Village and experimenter. | Crop and date of Experiment. | Local Estimate in Annas. | Yield according to Formula. | Average per Acre. | | | | | | Area of Test. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Seed. | Yield of | | Total Value of Produce. | Assessment, excluding Local Funds. | Incidence of Assessment on the Value of gross Produce. | |
| | | | | | | Principal Product | Rye product. | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | **KAIRA**—*continued.* | | Annas. | Lbs. | Lbs. | Lbs. | Lbs. | Rs. a. p. | Rs. a. p | Per cent. | A. g. |
| | *Mr. H. R Cooke, Collector*—continued. | | | | | | | | | | |
| 10 | Mátar (Kathváda) ... | Rice (Jini), 22nd November 1891. | 8 | 1,125 | 19½ | 1,427 in husk. | ... | 43 8 2 | 8 3 9 O. S. | 18·92 | 0 4 |
| 11 | Mátar (Navágám)... ... | Do. | 16 | 2,250 | 18 | 2,774 Do. | ... | 88 10 7 | 10 5 0 O. S. | 12·32 | 0 4 |
| 12 | Mátar (Navágám) ... ... | Rice (Sutarsál), 23rd November 1891. | 7 | 985 | 8⅕ | 1,562 in husk. | ... | 40 7 8 | 6 3 2 O. S. | 15·31 | 0 4 |
| 13 | Mátar (Náyka) ... ... | Do. (Kamod), 24th November 1891. | 16 | 2,250 | 14 | 2,694 Do. | ... | 93 9 8 | 8 12 10 O. S. | 9·40 | 0 4 |
| | **PANCH MAHA'LS.** | | | | | | | | | | |
| | *Mr. E. Maconochie, Assistant Collector.* | | | | | | | | | | |
| 14 | Godhra (Hansápur)... ... | Do. (Vánkla), 7th November 1891, | 8 | 640 | 20½ | 810 Do. | 700 | 18 12 0 | 0 14 6 O. S. | 4·83 | 0 4 |
| | *Mr. Pránlál Harkisandás, District Deputy Collector.* | | | | | | | | | | |
| 15 | Dohad (Kharedi) ... ... | Maize (makái, dholi), 15th October 1891; followed by a mixture of | 12 | 900 | 12½ | 1,436 | 1,332 | 32 10 0 | 1 14 0 R. S. | 5·75 | 0 10 |
| 16 | Do. ... .. | Rod Gram, | 8 | 370 | 64 | 443 | 360 | 10 7 4 | Do. ... R. S. | 13·68 | 0 10 |
| | | Barley ... | | 170 | 19½ | 111 | 124 | 2 11 4 | | | |
| | | and Rape, 8th March 1892. | | 5 | 1½ | 11 | 16 | 0 8 8 | | | |
| | | | | | | | | 13 11 4 | | | |
| | **BROACH.** | | | | | | | | | | |
| | *Mr. S. L. Batchelor, Assistant Collector.* | | | | | | | | | | |
| 17 | Jambusar (Khánpor) ... | Wheat (Potia?), 8th February 1892. | 18 | 1,140 | 40 | 492 | 810 | 27 12 7 | 3 12 7 O. S. | 13·62 | 0 8 |
| 18 | Amod (Ghamnád) ... ... | Chickling Vetch, (Láng), 9th February 1892. | 19 | 845 | 40 | 925 | 1,323 | 32 4 8 | 5 3 2 O. S. | 16·09 | 0 8 |
| 19 | Jambusar (Jambusar) ... | Juvár (Sorghum vulgare), 10th February 1892. | 20 | 1,300 | 8 | 792 | 796 | 17 13 8 | 3 11 1 O. S. | 20·68 | 0 10 |

*Northern Division, 1891-92*—continued.

R. S. = Revision Survey.

| Equivalent in Tolas of local measure Ser. | Prices of Produce per Rupee. Grain. | By-Product. | Remarks. |
|---|---|---|---|
| 13 | 14 | 15 | 16 |
| Tolas. | Lbs. | Cwt. | |
| Weight ser =40 | 33⅜ in husk. | ... | *Experiment No. 10*:—*Besar kiári* land, manured with 15 cart-loads of cowdung before sowing, growing continuous rice without any second crop. Field irrigated thrice from the Khári river by means of a water-lift. Cultivation good, but the season being very late, crop did not get sufficient water at the last irrigation. By-products valued though not weighed. Grain weighed wet, but figures corrected according to dryage reported. |
| Do. ... | Do. ... | ... | *Experiment No. 11*:—Similar soil and manured in the same way. Irrigated twice from the Khári, and once from a well. Rotation irregular:—(1) barley and rice, (2) rice, (3) and (4) barley, and (5) rice and wheat. Seed sown in July and transplanted in September. Area of seed-bed not ascertained. Figures of outturn and by-products as in last experiment. |
| Do. ... | 39⅜ in husk. | ... | *Experiment No. 12.—Besar* soil irrigated from the Khári river and manured with 2½ carts of cattle dung. Rotation:—(1) rice, wheat and barley, (2) rice and wheat, (3) fallow, (4) and (5) rice. Seed-rate compared with the formulæ, less than half. Crop half the average of the táluka, but yield much higher than that given in formulæ for a seven-anna crop. By-product not weighed, but valued. Figures corrected according to dryage reported. |
| h ... | 29⅛ Do. | ... | *Experiment No. 13.—Besar* soil irrigated from the Khári and by means of a tank filled by the same river and manured with 5½ cart-loads of cattle dung. Rotation:—rice and wheat every year, except 1888-89, when rice alone was grown. Cultivation good. Season as above. By-product valued. Figures corrected. |
| Do. ... | 45⅐ Do. | 5 | *Experiment No. 14.*—Inferior rice *vánkla*, on mixed black *bhuri* unirrigated land growing rice continuously for the last four years. Manured with about 15 cart-loads of cow and goat dung per acre applied before rains commenced. Seed-rate low for rice not transplanted. Season unfavourable and no weeding done. |
| Do. ... | 46⅝ | 6 | *Experiment Nos. 15 and 16.*—These tests are on twice cropped *gorádu* or light brown dry-crop land growing maize followed by gram and rape as a second crop during the two previous years. No manure was applied this year. Rain was sufficient for maize, the first crop; the second crop is said to have suffered from want of moisture. Seed-rate of kharif crop low and of rabi crop high. |
| D | 46⅝ | 3¾ | |
| Do. ... | 46⅝ | 3¾ | |
| | 20½ | ... | |
| 10 | 20½ | 1⅒ | *Experiment No. 17.*—Wheat, *potia* (?), on a black cotton soil, growing in rotation wheat and cotton. The land is manured only once in six years with about 10 carts of cattle dung per acre, the last time 3 years since. Season favourable and cultivation careful; field free from weeds. Crop estimated at 18 annas, but yield less than half that of the formulæ. Seed-rate compared with the formulæ (60 lbs) low. |
| Do. ... | 36½ | 1⅝ | *Experiment No. 18.*—Rich black cotton soil growing in rotation:—(1) cotton and (2) either *juvár* or *láng*. No manure used. The field low-lying, a suitable condition for *láng*. Season very favourable. Incidence rather high, but the burden of assessment must apparently lie rather on cotton, the principal crop, than on one grown for rotation. |
| Do. ... | 54⅜ | 2⅒ | *Experiment No. 19.—Juvár* on a dry-crop unmanured black soil growing *juvár* and cotton in alternate years. Season favourable and cultivation careful. Crop estimated at 20 annas, but actual yield low. Seed-rate about average for Broach. Incidence very high, but the remarks made above apply here also. |

*Summary of Crop Experiment Reports,*

O. S. = Original Survey;

| No. | District, Ta'luka, Village and Experimenter. | Crop and date of Experiment. | Local Estimate in Annas. | Yield according to Formulæ. | Average per Acre. | | | | | | Area of Test. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Seed. | Yield of | | Total Value of Produce. | Assessment, excluding Local Funds. | Incidence of Assessment on the Value of gross Produce. | |
| | | | | | | Principal Product. | By-product. | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | | | Annas. | Lbs. | Lbs. | Lbs. | Lbs. | Rs. a. p. | Rs. a. p. | Per cent. | A. g. |
| | **BROACH**—*continued.* | | | | | | | | | | |
| | *Mr. Phirozshdh Pestanji, District Deputy Collector.* | | | | | | | | | | |
| 20 | Vágra (Ráhád)... ... ... | Chickling Vetch, (Laing), 22nd February 1892. | 12 | 400 | 41 | 1,055 | 1,520 | 28 7 0 | 4 13 4 O. S. | 16·99 | 0 16 |
| 21 | Do. ... ... | Wheat (Katha), 28th February 1892. | 12 | 675 | 61½ | 849 | 1,130 | 36 11 6 | 4 13 4 O. S. | 13·16 | 0·16 |
| 22 | Vágra (Wahiál) ... ... | Cotton, 12th March to 8th April 1892, 3 pickings. | 14 | 310 | 7½ | 502 seed. cotton. | ... | 29 1 1 | 2 9 5 O. S. | 8·90 | |
| | **SURAT.** | | | | | | | | | | |
| | *Mr. Anna Gopál Kotvál, District Deputy Collector.* | | | | | | | | | | |
| 23 | Bárdoli (Pera) ... ... ... | Castor seed (Diveli), 2nd March 1892. | 12 | 340 | 45½ | 458 seed. | ... | 20 11 4 | 7 12 8 O. S. | 37·59 | 0 4 |
| 24 | Do. (Tarbhán) ... ... | Do. 16th March 1892. | 12 | 340 | 33⅓ | 488 Do. | ... | 22 0 9 | 3 4 4 O. S. | 14·81 | 0 |
| | *Mr. Dárdsha Dosábhái, District Deputy Collector.* | | | | | | | | | | |
| 25 | Bulsár (Wásiar) ... ... | Do. 29th February 1892. | 10 | 280 | 41½ | 427 Do. | ... | 19 11 0 | 1 13 8 O. S | 9·41 | |
| | **THÁNA.** | | | | | | | | | | |
| | *Mr. Mirza Abbás Alí Baig, Assistant Collector.* | | | | | | | | | | |
| 26 | Kalyán (Wádavli) ... ... | Rice (Dodka) 6th November 1891; followed by | 10 | 775 | 61 | 988 in husk. | 1,920 straw; 333 chaff. | 32 9 8 | 5 2 5 O. S. | 15·79 | 0 6 |
| 27 | Do. ... ... | Large fruited Dolichos, (Vál) 9th March 1892. | 11 | 280 | 43 | 359 | 164 | 11 14 6 | 5 2 5 O. S. | 43·26 | 0 6 |

*Northern Division, 1891-92*—concluded.

R. S. = Revision Survey.

| Equivalent in Tolas of local measure Ser. | Prices of Produce per Rupee. Grain. | By-product. | Remarks. |
|---|---|---|---|
| 13 | 14 | 15 | 16 |
| | Tolas. | Lbs. | Cwts. | |
| Weight ser =40 | | 62$\frac{1}{5}$ | 1$\frac{1}{5}$ | *Experiment No. 20* :—Chickling vetch or *láng* sown on good black soil of fair depth, growing usully wheat or *láng* or both followed by cotton in the second year. During the three previous years the rotation was :—(1) *láng* and wheat, (2) cotton and (3) fallow. The last not customary except on large holdings. The field is never manured. Rain-fall exceptionally heavy for the early, but favourable to rabi crops ; the field under test low-lying and retentive of moisture. Tillage good. Crop estimated at only 12 annas, but actual yield more than bumper due partly to good season and partly to the land having been originally prepared for cotton which was sown but destroyed by the heavy rain-fall in July-August. |
| Do. ... | | 28$\frac{1}{2}$ | 1$\frac{1}{2}$ | *Experiment No 21* :—Dry-crop *Kátha* wheat on another part of the same field cultivated by a *Bohora* tenant. (1) *Lang*, (2) cottou and (3) wheat were grown during the three previous years. The land received no manure this season, but had a top-dressing of about 8 carts of farm-refuse in the previous year. Season good. Cultivation very careful. Land prepared for cotton, which, however, was not sown owing to heavy showers of July-August. |
| ... | | 17$\frac{1}{2}$ seed cotton. | ... | *Experiment No. 22.*—Cotton on a moderately good black (*duyam káli*) soil, growing *láng* or wheat, or both, alternating with cotton. Heavy rain destroyed the first sowing. Crop re-sown in August and did very well. The field lies a considerable distance from village and never gets manure. Cultivation very careful. |
| ... 37 | | 22$\frac{1}{7}$ castor seed. | ... | *Experiment No. 23.*—Castor seed taken as a second crop on a rich black *marcho* soil, manured with about 48 carts of cowdung per acre applied before rice, the first crop, was sown. Rotation undefined but for the three previous years the crops were :—(1) *vál*, (2) rice and *vál*, and (3) rice and castor. Field ploughed thrice before castor was put in. Early rains heavy, but scanty towards the close, being deficient both for rice and castor. Incidence very high, but calculated on the second crop alone. Seed-rate high, but the formulæ seed-rate is much too low. |
| Do. ... | | Do. | ... | *Experiment No. 24.*—Black *richania* soil similarly manured. Rotation :—(1) rice, (2) and (3) rice and *vál*. Field ploughed four times after rice, the first crop, was harvested. Season as above. Cultivation good. Yield higher than in the above test with a lower seed-rate. Incidence on the second crop only. |
| | | 21$\frac{3}{5}$ Do. | ... | *Experiment No. 25.*—Dry-crop black soil growing castor every year without manure. Season not very favourable, but tillage good. Moisture conserved by erection of earth-bunds around the field. Seed-rate rather high. |
| 10 | | | | |
| 49 | | 40 in husk. | 3$\frac{3}{7}$ straw ; 1 chaff. | *Experiment Nos. 26 and 27.*—First class dark brown *garvi* land growing rice every year followed by *vál* as a second crop. Seed-bed manured with 192 lbs. of dry cowdung per guntha. Tillage good, but season unfavourable. Rains came late and ended early. September-October rain which is very important for *dodki* rice failed. The grain did not fill well. Area of seed-bed required for an acre of plantation estimated at 5$\frac{1}{4}$ gunthas. |
| 84 | | 30$\frac{1}{3}$ | ... | *Vál* unmanured gave a satisfactory outturn, moisture left in soil being about sufficient. Fodder useful but not valued. Incidence of assessment on both crops 11·57 per cent. |

*Summary of Crop Experiment Reports,*

O. S.=Original Survey;

| No. | District, Táluka, Village and Experimenter. | Crop and date of Experiment. | Local Estimate in Annas. | Yield according to Formulæ. | Average per Acre. | | | | | | Area of Test. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Seed. | Yield of | | Total Value of Produce. | Assessment, excluding Local Funds. | Incidence of Assessment on the Value of gross Produce. | |
| | | | | | | Principal Product. | By-product. | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | **KHA'NDESH.** *Mr. K. R. Bamanji, Assistant Collector.* | | Annas. | Lbs. | Lbs. | Lbs. | Lbs. | Rs. a. p. | Rs a. p. | Per cent. | A. g. |
| 28 | Sindkheda (Betáwad) .. | Linseed (Alsi), 2nd February 1892. | ... | ... | 17 | 603 Seed. | 394 chaff; 344 boori. | 28 1 3 | 1 1 10 O. S. | 3·96 | 0 10 |
| 29 | Do. do. ... *Mr. J. C. Gloster, Assistant Collector.* | Do. 3rd February 1892. | 12 | 250 | 11⅓ | 384 Do. | 244 chaff; 225 boori. | 17 14 0 | 2 2 6 O. S. | 12·06 | 0 10 |
| 30 | Bhusával (Edlabad) ... | Do. 11th February 1892. | 16 | 400 | 15 | 570 Do. | 435 chaff; 370 straw. | 27 8 0 | 1 4 10 R. S. | 4·73 | 0 8 |
| | **NA'SIK.** *Mr. L. G. Deshmukh, Assistant Collector.* | | | | | | | | | | |
| 31 | Málegaon (Nilgawhán) ... *Mr. H. W. Hayward, Assistant Collector.* | Sesamum (Káthali til), 21st October 1891. | 16 | 560 | 1⅝ | 438 Do. | 1,315 | 30 7 6 | 0 15 5 O. S. | 3·16 | |
| 32 | Igatpuri (Wádiware) ... | Niger seed, (Khurásni) 16th November 1891. | 16 | 400 | 3 | 279 Do. | 880 | 10 5 0 | 0 6 0 R. S. | 3·63 | 0 8 |
| 33 | Igatpuri (Igatpuri) ... | Do. 21st November 1891. | 16 | 400 | 9 | 264 Do. | 895 | 9 11 0 | 0 6 0 R. S. | 3·87 | 0 |
| 34 | Niphád (Niphád) ... ... | Linseed (Alsi), 4th February 1892. | 16 | 400 | 9 | 251 Do. | 450 | 13 10 4 | 2 3 1 R. S. | 16·06 | 0 8 |
| | **AHMADNAGAR.** *Mr. Sorábji Padamji, Assistant Collector.* | | | | | | | | | | |
| 35 | Kopargáon (Kopargáon) ... | Gram; .. | 4 | 40 | 12 | 66½ | 128 chaff; 56 stalks. | 3 10 8 | 0 6 1 R. S. | 5·90 | |
| | | with rows of jowári; | | 10 | ⅜ | ... | 336 kadbi. | 2 0 0 | | | |
| | | and safflower mixed, 9th January 1892. | | 5 | ⅜ | 30½ | 12 chaff; 12 stalks. | 0 12 5 | | | |
| | | | | | | | | 6 7 1 | | | |
| 36 | Akola ... ... ... *Mr. R. B. Stewart, Assistant Collector.* | Wheat (Kátha) and safflower mixed, 7th February 1892. | 12 | 350 | 30½ | 1,956 | 3,255 | 87 12 5 | 1 10 11 R. S. | 1·55 | 0 8 |
| | | | | 50 | 4½ | 969 | 385 | 20 10 0 | | | |
| | | | | | | | | 108 6 5 | | | |
| 37 | Nevása (Pravara Sangam) . | Wheat (Desoli) and safflower (Kardai), 8th February 1892. | 12 | 450 | 36 | 195 | 3¾ bundles. | 7 14 6 | 1 0 5 R. S. | 11·96 | 0 8 |
| | | | 16 | 60 | 4 | 22 | ... | 0 10 9 | | | |
| | | | | | | | | 8 9 3 | | | |

*Central Division, 1891-92.*

R. S.=Revision Survey.

| Equivalent in Tolas of local measure Ser. | Prices of Produce per Rupee. Grain. | By-product. | Remarks. |
|---|---|---|---|
| 13 | 14 | 15 | 16 |
| Tolas. | Lbs. | Cwts. | |
| 125 | 22⅛ Seed. | 4¾ | *Experiment No. 28.*—Linseed on medium black soil. The following sequence of crops was grown during the last three years:—(1) *jowári*, (2) cotton and castor, (3) *bájri* and kidney-bean. Crop unmanured. Season fair. Cultivation good. Anna estimate not given. Crop a full average one. Seed sown about 6 lbs. more than average rate of district. Sample weighed 124 tolas in this office. |
| 125 | 22⅛ Do. | 4¾ | *Experiment No. 29.*—Same crop on an *aval káli* or rich black soil without manure. The last three years' cropping was:—(1) *jowári* and *tur*, (2) linseed, *jowári* and *tur*, and (3) wheat and gram. Cultivation fair. The crop always a delicate one, more affected by an irregular season, on this heavy land than on the light soil of the previous test. Seed-rate, 11 lbs. per acre, average. The formulæ seed-rate, 6 lbs. per acre, is evidently wrong. Sample same weight as above. |
| 126½ | 23 1/16 Do. | 2¼ chaff; 3¾ straw. | *Experiment No. 30.*—Linseed on reddish brown sloping unmanured land usually growing kharif-crop only. Field usually grows cotton and *jowári* in alternate years. Cultivation indifferent, but rain favourable for rabi crops generally. No kharif crop raised this year. Yield under-estimated. Sample ser weighed 125 tolas. |
| [illegible] | 14⅝ Do. | ... | *Experiment No. 31.*—*Káthálli til* grown on an ordinary black soil without manure. The land was unsown for two years before which *bájri* was taken. Cultivation good, and season favourable. Seed-rate average. Out-turn low. Seed 1⅛ lbs. per acre. (The formulæ seed-rate, 6 lbs. per acre, is absurd). |
| 88 | 27 Do. | ... | *Experiment No. 32.*—Stony light *mál* land growing without manure niger-seed and *nágli*, alternately. Field lay fallow last year. Season more favourable to niger than for other crops. Seed-rate low. Crop estimated at 16 annas for this class of land. By-product useful as fodder and for rab, but not valued. |
| 89 | 27⅛ Do. | ... | *Experiment No. 33.*—Same crop on a similar soil. Field fallow for the last three years. Seed-rate treble that in the above test, but yield slightly below it. By-product not valued. |
| 95⅜ | 18½ Do. | ... | *Experiment No. 34.*—Linseed on a medium black soil grown without manure or irrigation. Rotation undefined, but recently *bájri* has alternated with linseed. Season fair. Yield over-estimated at 16 annas. Incidence rather high, not accounted for by the experimenter. |
| [illegible] | 25⅛ | 1 9/14 | *Experiment No. 35.*—Gram, principal crop, *jowári* and *kardai* subordinate crops on poor *barad* land with murum underlying a thin upper layer of black soil. Crop practically a failure owing to deficient rainfall. |
| | ... | 1½ | |
| | 41⅜ | 5¼ | |
| 109 | 25 | 5¾ | *Experiment No. 36.*—Wheat, *kátha*, and safflower mixed on an unirrigated black soil manured with 10 carts per acre of household sweepings and rubbish, applied before commencement of the rains. Rotation:—(1) *bájri*, (2) *udid* or black gram, and (3) *bájri*. A field of 4 acres and 30 gunthas was sown with 52 sers of wheat and 8 sers of safflower mixed together. Want of sufficient moisture is said to have slightly affected the quality of wheat, but the quantity realized is more than five-fold that given in the formulæ for a 12-anna crop, leaving out of consideration the yield of *kardai* which was not ripe at the time of experiment and was tested afterwards by the Mámlatdár. Tillage very careful. |
| 90 | 48½ | 5½ | |
| 116 | 26¾ | 6 bundles. | *Experiment No. 37.*—Wheat and safflower sown mixed with a two-coulter drill on an unirrigated and unmanured black soil. Rotation:—(1) cotton and wheat, (2) *bájri*, *tur* and gram. Rainfall short, but tillage careful. Wheat estimated at 12 annas and *kardai* at 16 by the experimenter. These estimates are evidently too high; the average of the táluka was about 9 annas, and they conflict also with the formulæ. |
| 88 | 33½ | ... | |

*Summary of Crop Experiment Reports,*

O. S.=Original Survey;

| No. | District, Táluka, Village and Experimenter. | Crop and date of Experiment. | Local Estimate in Annas. | Yield according to Formulæ. | Average per Acre. | | | | | | Area of Test. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Seed. | Yield of | | Total Value of Produce. | Assessment, excluding Local Funds. | Incidence of Assessment on the Value of gross Produce. | |
| | | | | | | Principal Product. | By-product. | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | **AHMADNAGAR**—*continued.* | | Annas. | Lbs. | Lbs. | Lbs. | Lbs. | Rs. a. p. | Rs. a. p. | Per cent. | A. g. |
| | *Mr. R. B. Stewart, Assistant Collector*—contd. | | | | | | | | | | |
| 38 | Nevása (Pravara Sangam)... | Gram and safflower (kardai), 8th February 1892. | 16 | 460 | 32 | 475 | 1½ bundles. | 15 0 1 | 1 2 0 R. S. | 7·49 | 0 8 |
| | | | 11 | 35 | 4 | 7½ | ... | 0 3 5 | | | |
| | | | | | | | | 15 3 6 | | | |
| | *Mr. V. B. Vádekar, District Deputy Collector.* | | | | | | | | | | |
| 39 | Karjat (Karjat) ... ... | Jowári (guldháv), | 11 | 360 | 4 | 291 | 500 kadbi; 70 chaff. | 15 2 6 | 0 4 6 R. S. | 1·60 | 0 4 |
| | | and safflower (kardai), 1st February 1892. | 11 | 40 | 1 | 98 | 110 chaff. | 2 5 6 | | | |
| | | | | | | | | 17 8 0 | | | |
| 40 | Karjat (Kuldharan) ... | Jowári (shrikhandi). | 11 | 360 | 4 | 415 | 250 kadbi; 80 chaff. | 15 13 4 | 0 3 11 R. S. | 1·36 | 0 |
| | | and safflower (kardai), 14th February 1892. | 8 | 25 | 1 | 87 | 100 chaff. | 2 2 2 | | | |
| | | | | | | | | 17 15 6 | | | |
| | **POONA.** | | | | | | | | | | |
| | *Mr. C. P. B. Wiltshire, Assistant Collector.* | | | | | | | | | | |
| 41 | Mával (Náne) ... ... | Wheat (Potia), 6th February 1892. | 14 | 540 | 65 | 188 | 158 straw; 134 bran. | 9 8 6 | 1 5 2 R. S. | 13·88 | 0 8 |
| 42 | Do do. ... ... | Do. ... | 16 | 640 | 92 | 206 | 136 straw; 144 bran. | 9 9 9 | 1 3 9 R. S. | 12·84 | 0 8 |
| 43 | Khed (Chákan) ... ... | Potatoes, 18th February 1892. | 6 | 2,300 | 547 | 2,317 | ... | 84 12 3 | 1 3 4 R. S. | 1·42 | 0 4 |
| | *Mr. W. T. Morison, Assistant Collector.* | | | | | | | | | | |
| 44 | Indápur (Shelgáon) ... | Ground-nut (Bhuimug), 16th February 1892. | 16 | 3,200 | 14 | 415 in shell. | 90 | 15 2 6 | 0 3 0 O. S. | 1·23 | 0 8 |
| 45 | Indápur (Indápur) ... ... | Wheat (Kapli or Jod), 21st February 1892. | 16 | 1,440 | 109 | 1,971 in husk. | 1,930 | 85 0 10 | 1 0 10 R. S. | 1·23 | |
| | *Mr. J. Mollison, Superintendent of Farms.* | | | | | | | | | | |
| 46 | Haveli (Bopodi) ... ... | Sugar-cane (Pundia), 30th and 31st March 1892. | 13 | 3,720 | About 16,000 to 20,000 sets. | 7,280 gul. | 8,640 fresh tops. | 495 5 0 | 1 6 6 R. S. | 0·28 | 0 4 |
| 47 | Do. do. ... ... | Sugar-cane (Pundia), 19th April 1892. | 12 | 3,000 | 14,996 sets = 6,516 lbs. | 6,740 gul. | 8,530 fresh tops. | 388 9 2 | 2 10 4 R. S. | 0·68 | 0 4 |

*Central Division, 1891-92*—continued.

R. S.=Revision Survey.

| Equivalent in Tolas of local measure Ser. | Prices of Produce per Rupee. Grain. | By-product. | Remarks. |
|---|---|---|---|
| 13 | 14 | 15 | 16 |
| Tolas. | Lbs. | Cwts. | |
| 114 | 32½ | 5⅛ bundles. | *Experiment No. 38.*—Similar soil with a mixture of gram and *kardai*. Crops grown during the two previous years were :—(1) wheat, gram and *jowâri*, (2) *bâjri* and *tur*. Season and tillage as above. |
| 88 | 33¾ | ... | |
| 108 | 33¾ | 6 | *Experiment No. 39.*—Brown *barad* land growing without manure or irrigation *jowâri* and *kardai* mixed, every two years, followed by one year of *jowâri* singly. Two rows of *kardai* were put in after six rows of *jowâri*, the former covering only a sixth of the space taken up by the latter. Tillage good, but land rather sloping and not retentive of moisture. Season generally below average and crop indifferent. Land free from weeds. |
| 85 | 44½ | 4⅛ | |
| 108 | 33¾ | 9 | *Experiment No. 40.*—*Jowâri* and *kardai* sown mixed on a black level land unmanured. Rotation :—(1) fallow for 3 years, (2) *jowâri* alone, (3) *jowâri* and *kardai* mixed. Season, &c., as above. Yield of grain higher, but that of *kadbi* lower than in above test. |
| 85 | 44½ | 4⅛ | |
| 104½ | 20¾ | 8½ straw ; 4 bran. | *Experiment No. 41.*—Wheat, *potia*, on a blackish *malai* land growing wheat every year without manure or irrigation. No rain after sowing. Cultivation indifferent ; anna estimate much too high. Actual yield not more than 6 annas. Sample weighed in this office 102 tolas. |
| 107 | 22½ | 8½ straw ; 4 bran. | *Experiment No. 42.*—Same crop on a *kâlvat* unirrigated and unmanured land growing wheat every other year and remaining fallow in the interval. Season and tillage as above. Seed-rate high for dry-crop. Crop estimated at 16 annas, but yield not more than 7 annas. Sample ser 104 tolas. |
| 76¼ weight ser. | 27⅛ | ... | *Experiment No. 43.*—Potato on a red *murum* land manured with 10 carts of cowdung applied before sowing and irrigated from a well opened since settlement. Sets cut and planted in furrows made by ordinary *nângar* and covered by earth moved in forming next furrow. Rotation :—two years of *bâjri* followed by a double crop of potatoes. Rain being scanty, season indifferent. Tillage good. Seed-rate under-estimated. Crop very poor. Incidence on the second crop alone and its lowness due to abnormally high price of potatoes. |
| 78 weight | 31¼ in shell. | 6 | *Experiment No. 44.*—Light red *mâl* land with hard gravel below at a depth of 8 inches, locally called *chickniche rân*, growing without manure *bâjri* and *bhuimug* in alternate years. Season exceptionally bad owing to scanty rain, but crop watered eight times from the Nira canal at a charge of Rs. 4 per acre. Cultivation poor, field ploughed once only. Seed-rate very low, being only a fourth of that in the formulæ. Yield also low. Incidence not high, because of high market rates for produce. |
| | 24¼ in husk. | 5 | *Experiment No. 45.*—Wheat, *khapli* or *jod*, on an irrigated red soil growing annually maize followed by wheat. Manured with 22 cart-loads of cowdung per acre applied in September after reaping of the early crop. Rain scanty, but the crop under test watered regularly once a week for five months from a well built before settlement. Field just outside the town and well cared for. Yield bumper ; seed-rate high ; straw not useful as fodder, but sold for thatching at about 2 annas per 100 bundles. Incidence on the second crop alone. |
| 78 weight ser. | 15 gul. | ... | *Experiment No. 46.*—*Pundia* or soft white Mauritius cane on a brown *murmât* land with rock at about 18 to 24 inches below the surface. Rotation :—*jowâri* followed by sugarcane ratooned in the second year. Land heavily manured with town sweepings in March before the sets were planted and a top-dressing of castor-cake given in July before the formation of fresh beds. Tillage careful. Field ploughed twice before and twice after application of manure and weeded four times. Season good at first, but water in the Mutha canal, from which the crop was irrigated, ran short in February, and reduced the outturn to 13 annas. The ashes of leaves and crushed canes burnt in making *gul* are useful as manure and valued at Rs. 10 by the experimenter. Green tops fed to cattle working the mill and therefore not valued. |
| 80 weight ser. | 17½ Do. | 5 | *Experiment No. 47.*—Same crop on blacksoil in good heart on which groundnut was raised in the previous year, 40 carts of poudrette per acre were applied before planting. Tillage good and field clean. Water was scarce in the Mutha canal in May and June and the crop suffered in consequence. It had to be harvested a month too soon for this reason. Crop estimated at 12 annas. This estimate is in comparison with actual returns from similar land under the high cultivation practised near Poona. Two-thirds of the tops fed to bullocks working at the mill and not valued. |

*Summary of Crop Experiment Reports,*

O. S. = Original Survey;

| No. | District, Táluka, Village and Experimenter. | Crop and date of Experiment. | Local Estimate in Annas. | Yield according to Formulæ. | Average per Acre. | | | | | | Area of Test. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Seed. | Yield of | | Total Value of Produce. | Assessment, excluding Local Funds. | Incidence of Assessment on the Value of gross Produce. | |
| | | | | | | Principal Product. | By-product. | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | **SATARA.** | | Annas. | Lbs. | Lbs. | Lbs. | Lbs. | Rs. a. p. | Rs. a. p. | Per cent. | A. g. |
| | *Mr. G. D. Pánse, Assistant Collector.* | | | | | | | | | | |
| 48 | Válva (Ashta) ... ... | Ground-nut, 14th January 1892. | 16 | 3,200 | 96 | 1,032 in shell. | 10 bundles. | 149 9 0 | 1 15 8 O. S. | 1·01 | 0 10 |
| | *Mr. C. G. H. Fawcett, Assistant Collector.* | | | | | | | | | | |
| 49 | Khánápur (Kadegáon) ... | Ground-nut, 27th January 1892. | 16 | 3,200 | 95 | 1,907 Do. | 3,460 | 72 1 4 | 5 4 2 R. S. | 7·29 | 0 4 |
| | *Mr. T. D. Fry, Assistant Collector.* | | | | | | | | | | |
| 50 | Vái (Surul) ... ... ... | Ground-nut, January 1892. | 8 | 900 | 30¾ | 345 Do. | 1,784 | 17 14 8 | 6 1 3 O. S. | 33·48 | 0 5 |
| 51 | Jávli (Kusumbi) ... ... | Sugarcane (Pundia), 26th February 1892. | 11 | 2,100 | 5,040 canes. | 1,948 gul.. | 9,027 | 152 6 4 | 6 3 7 O. S. | 4·08 | 0 4 |

*Central Division, 1891-92*—concluded.

R. S. = Revision Survey.

| Equivalent in Toals of local measure Ser. | Prices or Produce per Rupee. | | Remarks. |
|---|---|---|---|
| | Grain. | By-product. | |
| 13 | 14 | 15 | 16 |
| Tolas. | Lbs. | Cwt. | |
| 78 weight ser. | 29 in shell. | 1 bundle | *Experiment No. 48.*—Groundnut on a first class black soil irrigated eight times from a well recently constructed. Field grows sugarcane, groundnut, *jowdri*, &c. 300 sheep were folded for three days and 10 carts of cowdung were applied before sowing. Season fair and cultivation good, seed-rate compared with the formulæ, high; yield also high, rising to bumper standard. |
| 43½ | 33½ Do. | 2 | *Experiment No. 49.*—Black soil of medium quality growing in rotation :—(1) *jowdri*, (2) *bdjri* and (3) *bhuimug*. 20 sheep were at first penned for four days and then eight carts of cowdung, ashes and village refuse were spread upon the 13¾ gunthas on which the crop was raised. Season unfavourable, rainfall being much below the average. The crop, however, watered towards the end, twice from a *pát* fed by a *dharan*. Seed-rate high, but yield below the formulæ standard. Sample ser received in this office weighed 39 tolas only. |
| 41 | 26¾ Do. | 3 | *Experiment No. 50.*—*Bhuimug* on a rich brown *shddu* soil manured with 800 sheep folded for five or six days a fortnight before sowing. Rotation undefined but the crops for the past three years were :—(1) *bhuimug*, (2) *bdjri* and (3) *rdla*. Season bad owing to scanty rain. Yield very poor though crop watered from a well. Seed half the formulæ rate. Sample ser weighed 39 tolas in this office. Anna estimate too high. |
| 26 ht ser. | 13⅓ gul. | 13 | *Experiment No. 51.*—Fairly rich reddish soil growing rice for three years followed by two years of sugarcane. Field manured with 100 baskets of cowdung per acre. The crop irrigated by a *dharan* from a *ndla* twice a month. Season bad, rain having fallen in the months of July and August only. Tillage good. |

*Summary of Crop Experiment Reports,*

O. S. = Original Survey ;

| No. | District, Ta'luka Village and Experimenter. | Crop and date of Experiment. | Local Estimate in Annas. | Yield according to Formulæ. | Average per Acre. | | | | | | Area of Test. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Seed. | Yield of. | | Total Value of Produce. | Assessment, excluding Local Funds. | Incidence of Assessment on the Value of gross Produce. | |
| | | | | | | Principal Product. | By-product. | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | **BELGAUM.** *Mr. J. H. DuBoulay, Assistant Collector.* | | Annas | Lbs. | Lbs. | Lbs. | Lbs. | Rs. a. p. | Rs. a. p. | Per cent. | A. g. |
| 52 | Khánápur (Bidi) ... ... | Rice (Dodd Bhatta), 17th November 1891. | 11 | 775 | 92½ | 2,677 in husk. | ... | 85 8 4 | 5 1 0 R. S. | 5·92 | 0 4 |
| 53 | Do. do. ... ... | Do. ... | 11 | 775 | 92½ | 2,169 Do. | ... | 70 2 6 | 5 7 3 R. S. | 7·77 | 0 4 |
| 54 | Do. do. ... ... | Do. (Mugud Bhatta) 17th November 1891. | 13 | 1,180 | 92½ | 3,025 Do. | ... | 94 2 8 | 5 9 3 R. S. | 5·91 | 0 8 |
| | **BIJA'PUR.** *Mr. W. C. Rand, Assistant Collector.* | | | | | | | | | | |
| 55 | Bágevádi (Bágevádi) ... | Spelt wheat (Jave Godhi), 29th February 1892. | 20 | 1,800 | 95 | 1,168 husked. | ... | 56 13 2 | 1 6 10 R. S. | 2·51 | 0 |
| 56 | Do. do. ... | Do. ... 1st March 1892. | 20 | 1,800 | 210 | 1,137 Do. | ... | 55 5 0 | 2 6 11 R. S. | 4·39 | 0 4 |
| | *Mr. J. M. Cursetji, District Deputy Collector.* | | | | | | | | | | |
| 57 | Hungund (Hungund) ... | Do. ... | 14 | 1,210 | 104½ | 1,381 in husk =1,084 husked. | 1,161 | 73 5 8 | 1 5 6 R. S. | 1·83 | 0 10 |
| | **DHA'RWA'R.** *Mr. R. E. Enthoven, Assistant Collector.* | | | | | | | | | | |
| 58 | Kod (Hirekerur) ... ... | Sugarcane (Rasdáli Khabbu), 21st and 22nd March 1892. | 18 | 5,400 | 3,000 sets. | 3,590 gul. | Crushed canes 12,960 lbs. Green tops gave 20,000 sets for replanting and 2,270 bundles dry blades = 6,240 lbs. | 236 14 0 | 7 8 0 R. S. | 3·16 | 0 4 |
| | *Mr. C. C. Boyd, Assistant Collector.* | | | | | | | | | | 4 |
| 59 | Bankápur (Shiggáon) ... | Italian Millet (Navani), 9th December 1891. | 12 | 350 | 8½ | 422 | 1,845 Kadbi 105 Chaff. | 12 11 3 | 1 6 10 R. S. | 11·23 | 0 |
| | **KOLA'BA.** *Mr. J. P. Orr, Assistant Collector.* | | | | | | | | | | |
| 60 | Roha (Roth Khurd) ... | Sweet rice (Támbad Halva), 23rd October 1891. | 20 | 3,000 | 56¼ | 2,403 in husk. | 1,915 | 55 15 10 | 6 4 7 O. S. | 11·23 | 0 8 |

*Southern Division, 1891-92.*

R. S. = Revision Survey.

| Equivalent in Tolas of local measure Ser. | Prices of Produce per Rupee. Grain. | Prices of Produce per Rupee. By-product. | Remarks. |
|---|---|---|---|
| 13 | 14 | 15 | 16 |
| Tolas. | Lbs. | Cwts. | |
| 60 | 34⅜ in husk. | ... | *Experiment No. 52.*—Unirrigated rice, *dodd bhatta*, on a reddish soil, locally called *masâri*, growing rice followed by large fruited dolichos every year, the latter being replaced by field pea occasionally. Manured with six cart-loads of a mixture of cowdung and green grass immediately after sowing. Cultivation indifferent, and season below average. Value of by-product included in column 9, though not weighed. Compared with the formulæ, outturn very high. No second crop raised this year owing to failure of rain. Sample ser weighed 57 tolas. |
| 60 | 34⅜ Do. | ... | *Experiment No. 53.*— Do. do. do. Manured with 8½ carts of cowdung and green grass, &c., &c. Sample ser weighed 56 tolas in this office. |
| 60½ | 34⅜ Do. | ... | *Experiment No. 54.*—Same crop on a similar soil watered during the rains by an occasional overflow from a neighbouring tank. Manured with a mixture of 10 cart-loads of green grass and cowdung said to have been applied immediately after sowing. Rotation same as above, but on the plot tested rice alone was raised during the past three years. Season as above, but cultivation more careful. Yield more than 2½ times that of the formulæ for a 13-anna crop. By-product valued higher than usual owing to scarcity. Sample ser weighed 58 tolas in this office. |
| [illegible]½ | 20½ husked. | ... | *Experiment No. 55.*—Wheat, *khapli* or *jave godhi*, on a reddish black *maddi* land irrigated from a well with ample water. The land classed as *bâgâyat*, but usually growing dry-crop *jowâri*, kharif or rabi, according to the nature of the season. Manured by sheep folding, but their number or period of folding could not be ascertained. Season favourable for an irrigated crop. Cultivation good. Seed-rate ordinary, but higher than formulæ. Yield rather low. Prices high, and incidence consequently low. |
| 140¾ | 20½ Do. | ... | *Experiment No. 56.*—Same crop on a greyish soil, *mardi*, growing (1) chillies and (2) late *jowâri*. Manured with 30 cart-loads of cowdung per acre in April and irrigated from a well. Season as above. Tillage careful. Seed-rate high. Figures doubtful. |
| 51 usk 81 ed. | 16⅜ Do. | 1⅜ | *Experiment No. 57.*—Black soil irrigated by a *mot* from a large well and manured with about 13 cart-loads per acre of cowdung, ashes, straw and other village refuse applied immediately before the wheat was sown. The plot tested grows wheat always. The other portion of the field had various crops in rotation. Season good for irrigated crops. Cultivation indifferent. Price of wheat much higher than in the above tests. Sample weighed in this office 83½ tolas. |
| | 17½ gul. | Crushed canes 23; green top 8¾; dry blades 3¾ | *Experiment No. 58.*—Sugarcane, *rasdâli khabbu*, on average black soil irrigated from the Hirekerur tank and growing rice for two years followed by sugarcane. Manured with 5 cart-loads of cowdung per acre applied in February and sheep folded for two days. Rainfall which came late, was on the whole favourable in the *mallâd*. Tillage fair. Value of by-product (Rs. 26-14-0) included in column 9. Yield below formulæ. |
| 2 | 45½ | 5 | *Experiment No. 59.*—*Navani* or Italian millet on red *masâri* land manured every year in June before sowing with 2½ cart-loads of cattle dung and fodder refuse. Rotation:—*jowâri* alternating with *navani*. Season not unfavourable, for *navani* which did not suffer to the same extent as other crops. Value of by-product rather high owing to demand for cattle imported from famine tracts. Seed-rate double that of the formulæ. Yield high. |
| 54 | 48 in husk. | 2⅞ | *Experiment No. 60.*—Sweet rice, *tâmbad halva*, on good soft *khalâti* soil, one foot deep, growing rice every year. Field swamped by the overflowing of a river for a few days just after transplantation and rain water passed through the field from and to others in the neighbourhood. Season very favourable and cultivation good. A two-guntha seed-bed raked and sown in June, gave seedlings for the whole field (17½ gunthas). |

*Summary of Crop Experiment Reports,*

O. S.=Original Survey;

| No. | District, Ta'luka, Village and Experimenter. | Crop and date of Experiment. | Local Estimate in Annas. | Yield according to Formulæ. | Average per Acre. | | | | | | Area of Test. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Seed. | Yield of | | Total Value of Produce. | Assessment, excluding Local Funds. | Incidence of Assessment on the Value of gross Produce. | |
| | | | | | | Principal Product. | By-product. | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | **KOLA'BA**—*continued.* | | | | | | | | | | |
| | *Mr. J. P. Orr, Assistant Collector*—continued. | | Annas. | Lbs. | Lbs. | Lbs. | Lbs. | Rs. a. p. | Rs. a. p. | Per cent. | A. g. |
| 61 | Roha (Roth Khurd) ... | Sweet Rice (Dodka Halva), 24th October 1891. | 20 | 3,000 | 44 | 1,953 in husk. | 1,926 | 45 0 0 | 4 14 7 O. S. | 10·91 | 0 8 |
| 62 | Do. do. ... | Do. (Támbad Halva), 26th October 1891. | 20 | 3,000 | 59 1/6 | 1,916 Do. | 1,816 | 45 15 10 | 0 4 0 O. S. | 0·54 | 0 8 |
| | *Mr. K. N. Bhángánkar, District Deputy Collector.* | | | | | | | | | | |
| 63 | Alibág (Náde) ... ... | Do. (White Halva), 5th November 1891. | 20 | 2,500 | 31 1/3 | 2,547 Do. | 2,943 | 69 1 10 | 5 11 2 O. S. | 8·24 | 0 4 |
| | **RATNA'GIRI.** | | | | | | | | | | |
| | *Mr. A. M. T. Jackson, Assistant Collector.* | | | | | | | | | | |
| 64 | Rájápur (Lánje) ... ... | Nágli (Khandála Eleusine coracana) and Vari (Dhamni) Panicum maliaceum sown mixed, 9th November. | 10 | 500 | 22 1/2 | 542 | 637 | 13 9 11 | 0 3 4 O. S. | 1·41 | 0 |
| | | | 10 | ... | 2/3 Ser. | 60 Sers. | ... | 1 1 11 | | | |
| | | | | | | | | 14 11 10 | | | |
| 65 | Ratnágiri (Náchane) ... | Nágli (Mutle), 23rd October 1891. | 12 | 800 | 3 | 1,348 | 2,092 | 39 6 11 | 0 4 4 O. S. | 0·68 | 0 |
| | *Mr. L. N. Ajgáonkar, District Deputy Collector.* | | | | | | | | | | |
| 66 | Sangameshvar (Wándri) ... | Nágli (Mahádi), 6th November 1891. | 13 | 1,060 | 5 1/3 | 427 | 920 | 10 12 0 | 0 3 9 O. S. | 2·1 | |
| 67 | Do. do. ... | Do. ... | 13 | 1,060 | 5 1/3 | 845 | 1,344 | 21 2 10 | 0 4 1 O. S. | 1·20 | 0 4 |
| 68 | Sangameshvar (Ojharkhol) ... | Do. 9th November 1891. | 12 | 1,000 | 12 | 867 | 1,660 | 21 13 0 | 0 3 6 O. S. | 1·00 | |
| 69 | Do. (Arawli) ... | Harik (Rámesari) Paspalum scrobiculatum, 16th November 1891. | 14 | 670 | 12 | 834 | 2,000 | 11 7 9 | 0 5 0 O. S. | 2·72 | |
| 70 | Chiplún (Khershet) ... | Do. (Bárik), 17th November 1891. | 12 | 500 | 12 | 487 | 1,800 | 6 15 0 | 0 3 1 O. S. | 2·77 | |
| | **KA'NARA.** | | | | | | | | | | |
| | *Mr. C. W. Hudson, Assistant Collector.* | | | | | | | | | | |
| 71 | Honávar (Mánkidurg) ... | Green Gram (Hesáru), 8th March 1892. | 10 | 220 | 39 | 450 | 690 | 12 1 4 | 6 7 3 O. S. | 53·4 | 0 4 |
| 72 | Do. ... ... | Sugarcane (Dás-khabbu), 9th March 1892. | 14 | 4,020 gul. | 15,000 sets. | 9,283 liquid jágri. | 8,520 Fresh tops; 21,375 number of seed-tops. | 377 15 6 | 4 4 8 O. S. | 1·13 | 0 2 |

*Southern Division, 1891-92*—concluded.

R. S.=Revenue Survey.

| Equivalent in Tolas of local measure Ser. | Prices of Produce per Rupee. Grain. | Prices of Produce per Rupee. By-Product. | Remarks. |
|---|---|---|---|
| 13 | 14 | 15 | 16 |
| Tolas. | Lbs. | Cwts. | |
| 54½ | 48 in husk | 3¾ | *Experiment No. 61*:—*Dodka halva* rice on similar but rather shallow rice land with *murum* within 8 inches. Field entirely dependent on rain water, and flow from neighbouring fields scarce. Season and tillage as above. A 3¾-guntha seed-bed supplied plants for 35 gunthas. Yield of grain below that in the above test, and also below the formulæ, due to inferiority of soil. |
| 53 | 47 Do. | 3 | *Experiment No. 62*:—Sweet *támbad halva* rice on hard but deep and rather gritty soil lately converted from *varkas* and growing rice during the past two seasons. Sheep folded on the field for a day and night and plants transferred from a rábed seed-bed. Season favourable and tillage good. Yield slightly below that in the above tests, but improving year by year. |
| 55⅜ | 42⅔ Do. | 3 | *Experiment No. 63*:—Sweet *halva* rice on a *nimgarvi* land growing rice alone every year and manured with 7 cart-loads of cowdung per acre in April-May before sowing. Seed-rate compared with the formulæ very low. Season favourable and tillage good. Sample received in this office gave only 53¾ tolas per ser against 55⅜ recorded by the experimenter. |
| 53½ | 41¼ | 12 | *Experiment No. 64*:—*Nágli* with a slight sprinkling of *vari* sown broadcast on *bharad varkas* land. Soil consists of decomposed laterite. Field grows *nágli* and *harik* or rice after lying waste five years. Manured with 33 maunds goat manure and 17 maunds cowdung per acre. Season indifferent. Tillage fair. Seed-rate high. |
| ... | 54 Sers. | ... | *Vari* measured, not weighed. |
| 43 1/32 | 35⅓ | 15 | *Experiment No. 65*.—*Nágli* alone on similar land growing sesamum after *nágli* after five years' fallow. Seed sown in a rábed seed-bed and planted out a month and half later with a piece of fish at the root of each seedling. Area of seed-bed for an acre of plantation 8⅛ gunthas. Season favourable and tillage good. Seed rate low but yield excellent. |
| 52 | 42⅔ | 11 | *Experiment No. 66*:—*Nágli* (*Mahádi*) on steep *varkas* land growing (1) *nágli*, (2) *harik* and (3) *vari* in succession after 7 years' fallow. Manured with 8 head-loads of *bhusa* of dried fish at the time of planting in July. 5¼ lbs. seed sown in 7 gunthas furnished seedlings sufficient for an acre. Season favourable, but yield low owing to bad cultivation. |
| | 42½ | 12 | *Experiment No. 67*:—Same crop on even but stony soil with similar rotation after three years' fallow. A piece of dried fish (in all 10 maunds per acre) put in with each seedling at the time of planting. Tillage fair and season good. |
| | 43 | 10 | *Experiment No. 68*:—Same crop on steep *varkas* land waste for 35 years. Brushwood (*kaval*) cut, spread and burnt as rab, and seed sown broadcast a month before the monsoon set in. Season good and field well cared for. |
| | 79 | 19 | *Experiment No. 69*:—*Harik* (*Rámesari*) 2nd crop in the usual rotation after 5 or 6 years' fallow on sloping unmanured land. Crop suffered slightly for want of rain, but cultivation good. |
| 48 | 79 | 21 | *Experiment No. 70*:—Same crop (*bárik harik*) on an upland, even but stony soil. A second crop after 5 years' fallow. Crop well taken care of but damaged by growth of a poisonous herb locally called *agya*. Yield consequently low. |
| 101¼ | 43 | 5 | *Experiment No. 71*:—Green gram, *hesáru*, on unirrigated sandy rice land, manured with 40 head-loads of cowdung and dry leaves burnt and spread over the land after the reaping of the early rice. Rotation, 2 rice crops each year with substitution of pulse for the 2nd crop of rice in the third year. Season fair, but cultivation bad. Incidence calculated on the 2nd crop alone. |
| ... | 26⅝ liquid jágri. | ... | *Experiment No. 72*:—Sugarcane on rice land, locally called *kempu mannu gadde*, growing rice followed by sweet potatoes for years and then sugarcane for two years. Field irrigated from an adjoining *nála*. Dry leaves from previous crop and crushed cane burnt in March; 2½ months later a top-dressing given consisting of 15 head-loads of cowdung and dry leaves and 10 head-loads of rubbish mixed with earth and burnt. Season favourable and tillage good. Value of seed-tops (Rs. 85-7-6) included in column 9, but that of fresh tops used as fodder not calculated. |

# APPENDIX.

*Details of the cost of cultivation of sugarcane crop on the Government Farm at Kirkee, referred to in Mr. J. Mollison's experiment (No. 47) on page 14.*

| Date. | Description of Work (Area 10 Gunthas). | Men. | Women. | Cattle. | Cost. Rs. a. p. |
|---|---|---|---|---|---|
| 30th January 1891 ... ... | Ploughing 1st, finished ... ... | 1¾ | ... | 5 | 1 3 0 |
| 26th February „ ... ... | Do. 2nd, do. ... ... | 1 | ... | 3 | 0 11 3 |
| 7th-10th „ „ ... ... | Digging head land ... ... | 2½ | ... | ... | 0 9 4 |
| 24th March „ ... ... | Ploughing 3rd... ... ... | 1½ | ... | 5 | 1 2 1 |
| 9th April „ ... ... | Harrowing ... ... ... | ½ | ... | ¾ | 0 3 8 |
| 12th „ „ ... ... | Spreading poudrette ... ... | 2 | 9 | ... | 1 9 6 |
| ..... | Cost of 10 loads poudrette ... ... | ... | ... | ... | 31 10 8 |
| 15th April 1891 ... ... | Levelling and making ridges ... | 1 | ... | 4 | 0 13 9 |
| 16th-17th „ „ ... ... | Breaking clods and making beds ... | 8½ | ... | ... | 1 15 10 |
| 25th „ „ ... ... | Watering and planting ... ... | 3 | 4 | ... | 1 3 3 |
| 27th „ „ ... ... | Watering from the canal ... ... | ½ | ... | ... | 0 1 10 |
| ..... | Cost of 3,499 sets (1,148 canes = 1,629 lbs.) at Rs. 2 per 1,000 sets ... ... | ... | ... | ... | 7 0 0 |
| 1st-28th May 1891 ... ... | Watering from the canal ... ... | 2 | ... | ... | 0 7 6 |
| 23rd „ „ ... ... | Hand weeding 1st ... ... | ... | 10 | ... | 1 4 [illegible] |
| 7th-28th June „ ... ... | Do. 2nd ... ... | ... | 12 | ... | 1 8 [illegible] |
| 9th-16th „ „ ... ... | Watering from the canal ... ... | 1 | ... | ... | 0 3 9 |
| 8th July „ ... ... | Do. ... ... | ½ | ... | ... | 0 1 10 |
| 16th „ „ ... ... | Hand weeding ... ... ... | ... | 5 | ... | 0 10 0 |
| 24th August „ ... ... | Do. ... ... ... | ... | 11 | ... | 1 6 [illegible] |
| 25th „ „ ... ... | Watering from the canal ... ... | ½ | ... | ... | 0 1 10 |
| 12th-19th September 1891 ... | Do. ... ... | 1 | ... | ... | 0 3 [illegible] |
| 18th „ „ ... | Digging and earthing up by contract ... | ... | ... | ... | 2 12 [illegible] |
| 18th October „ ... | Watering from the canal ... ... | ½ | ... | ... | 0 1 [illegible] |
| 2nd-28th November „ ... | Do. ... ... | 2¼ | ... | ... | 0 [illegible] 4 |
| 14th-27th December „ ... | Do. ... ... | 1¼ | ... | ... | 0 [illegible] |
| 12th-26th January 1892 ... | Do. ... ... | 1½ | ... | ... | 0 [illegible] |
| 4th-19th February „ ... | Do. ... ... | 1 | ... | ... | 0 [illegible] |
| 3rd-31st March „ ... | Do. ... ... | 1¾ | ... | ... | 0 [illegible] |
| 19th April „ ... | Cleaning for *gul*-making (18¾ men in six plots, Rs. 4-5-7) ... ... | ... | ... | ... | 0 11 [illegible] |
| ..... | **Gul*-making charges ... ... | ... | ... | ... | 13 5 [illegible] |
| ..... | Canal charges ... ... | ... | ... | ... | 12 8 [illegible] |
| ..... | Assessment ... ... ... | ... | ... | ... | 0 10 [illegible] |
| | Total cost of cultivation ... | ... | ... | ... | 86 1 [illegible] |
| | Total cost of cultivation per acre ... | ... | ... | ... | 344 7 0 |

* *Note.*—The *gul*-making charges include the hire of a sugarcane mill and boiling pan, &c., and the hire of 8 bullocks which were fed on the tops.